

THE BIOLOGIST

A Quarterly Journal Promoting Research
Interest in the Biological Sciences

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1951

Contributions

to

THE BIOLOGIST

OBJECTIVE: THE BIOLOGIST desires to publish comparatively short student contributions to the progress of the biological sciences, either as beginning research, progress reports or side line discoveries arising out of, or tangential to, completed or nearly completed research problems.

CONTRIBUTIONS: Articles submitted must represent some definite contribution to the biological field. Purely historical, biographical or historical articles by students will not be considered. Release of unclassified technical information will be secured from the OTS, U. S. Dept. of Commerce, by the Author in advance.

ADVISORY: The opinions of research specialists may be sought by the Editor as to the advisability of publishing any article submitted.

LENGTH: Articles must be as short as consistent with adequate treatment of the research reported. Extensive recapitulation of previous work on the problem should be eliminated.

ABSTRACTS: A brief summary of not more than fifty words must be separately presented with original copy for forwarding to *Biological Abstracts* as soon as the date of publication is determined. Summaries will follow the format used in *Biological Abstracts*.

ILLUSTRATIONS: Sharp photographs or clear line drawings *in ink*, NOT PENCIL, may be submitted. Lengths of articles should be curtailed in proportion to the extent of illustrations used. Cuts used will be paid for by the contributor at standard engraver's rates and become *his* property immediately after publication.

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REPRINTS: Free reprints will not be furnished to contributors. They may be ordered, however, at the time the proofs are returned to the Editor.

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TEACHING HUMAN BIOLOGY VIA TELEVISION

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"Television has its greatest influence on the young and the people with limited education. For them TV broadens the horizon as nothing else could . . . It is the greatest means of educating people and giving them facts ever dreamed of."—John S. Meck (Time, Feb. 19, 1951)

In the fall of 1950 an opportunity came to me to organize and teach the first college course ever to be offered for credit by way of television. The opportunity was the result of cooperative effort between Detroit News TV Station WWJ and two University of Michigan units, the television division and the Extension Service.¹ Although my primary field of interest is not human biology (rather the biology of fishes,) I was asked to undertake this new venture because of the work I had done in adult education and because I had been having a measure of success with a

course on the biology of man for the past six years as an offering of the Department of Zoology in the Detroit center of the Extension Service.

My previous experience in Television was limited to periodic interview appearances such as those experienced by many college teachers and research workers. I therefore knew little of what the possibilities might be or what I was getting into when I allowed myself to be persuaded into accepting the new responsibility. The opportunity for pedagogic experimentation and the challenge of teaching a "class" as large as a television audience (400,000 receivers in the Detroit area) were readily appreciated. Then I started learning what it really meant to put on a television show and above all what it meant to inspire interest and attitudes in students whose faces could not be seen and whose voices could not be heard. Throughout my learning in this teaching sphere, which is still far from complete, my colleagues in Television and Extension were of immeasurable help as were the station's TV Director, Walter Koste,

¹ Key motivating and collaborating personnel were: Harry Bannister, Manager of the Detroit News radio and television stations; Prof. Garnet Garrison, Director of Television in the University; Everett J. Soop, Director of the University's Extension Service; and Hazen Schumacher, Television Production Assistant.



Certificate of participation sent to registrants in telecourse who successfully completed final examination.

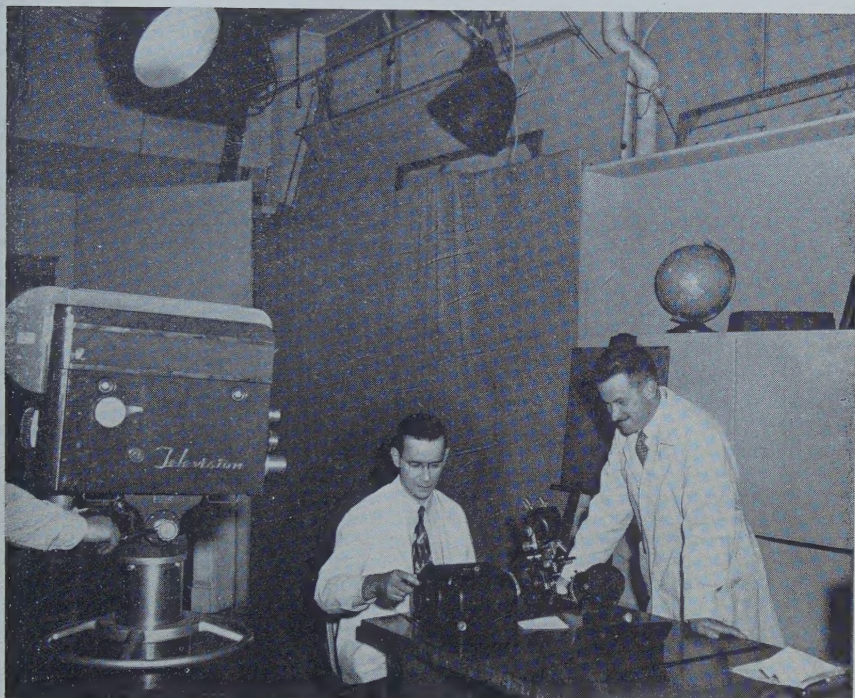
and his aides, particularly Thomas Sutton.

About a month before the course started, a lengthy series of conferences took place. The general plan of these conferences was for me to offer the classroom subject matter and associated visual aides to my producer and his staff for screening and for evaluation through the "eyes" of the television camera and receiver.

Selecting the title. One of the first problems to be considered was that of the title for Telecourse 1. The principles on which the selection was made were: (1) the title should be descriptive; (2) the title should be dignified; (3) the title should arouse interest rather than freeze it because of jargon which was too technical; (4) the title, with least possible change, should permit re-use later in other related courses. Applying these principles, we eliminated such names as: Life, Life Science, Science of Man, Human Biology, Anatomy and Physiology of the Human Organism, Human

Structure and Function. After much discussion, we settled upon a composite name: Man in His World—Human Biology. We felt that we had done a reasonably satisfactory job of satisfying the principles that we had set up. The first part of the name we thought was descriptive, dynamic, and at least somewhat interesting; the second part, to qualify the first part and to lean a little bit on the increasing recognition by the layman of the importance of science in human affairs. Subsequent courses might be easily named: Man in His World—Psychology; Man in His World—Physics; etc.

The teacher. As our preliminary meetings progressed and later as I taught, I learned something of the qualifications desired in a television teacher. He should embody as many of the following traits as possible: pleasing personality; good speaking voice; freedom from distracting mannerisms of speech or action; cooperative spirit; willingness to work extra hours



Preparing to televise the use of a microtome in preparing tissues for study and the use of a microscope in cytology and histology. Note simplicity of classroom props and presence on laboratory table of only that apparatus which will actually be needed for the demonstration. Guest specialist, Dr. Paul A. Wright, seated; author standing.

in order to perfect his lessons; awareness and/or experience in the use of audio-visual aids in teaching his subject; ability to make at least simple line drawings and to letter them legibly; ability to visualize response of an unseen class; and good knowledge of his subject. I cannot claim all of these qualifications but those which I did not have I tried hard to develop.

Philosophy of the course. Considerable time was spent in crystallizing the basic philosophy or attitude for instructing the course. It was early agreed that complete academic freedom would be necessary in order to demonstrate, without direct mention, the value of such freedom in the teaching both of facts and of the nature of theories. Explication of such touchy

subjects as evolution, mechanism, vitalism, eugenics, sex, intra-uterine development, and parturition was not held to be taboo. On the other hand, avoidance was practiced of the gruesome or repulsive such as teratology in human development or burn disfigurement by atomic bomb flash.

In order to speed and to assure understanding of even the more difficult parts of the subject, we planned to develop topics by working from the familiar to the unfamiliar, from the known to the unknown, where possible.

It was decided, too, that technical terms be used wherever they best convey exactness in description of structure or function. However, care was taken to define or describe such terms and to write or spell them out.

We avoided scientific hokum and gobbledygook—a finger was not called a digit, the gullet was not called the esophagus, except when first located as an anatomical part.

Course plan. The content of the course, in outline form, was set up and worked over with the production team before instruction was begun. I had the factual material rather well in mind, of course, and at first could see little point to this part of the operation. However, it soon became evident to me that going over the material with the group was of great value in the planning of settings, prop-

erties, charts, and other teaching aids. It was also useful in bringing guest specialists into consideration for the presentation of certain feature items of subject matter.

As in courses of instruction generally, it was desirable to organize this television course into lesson packages. Each lesson was first identified by its more or less classical name; these names were then evaluated for audience appeal and were changed by applying the principles used in selecting the course name. A list of the first proposed name and that finally adopted for each lesson will illustrate

MAN IN HIS WORLD—HUMAN BIOLOGY

<i>Lesson Number</i>	<i>Name first proposed for lesson</i>	<i>Name adopted</i>
1	Cells, tissues, organs, systems	The field of human biology
2	Digestive system and nutrition	Food and nutrition
3	Respiratory system	Respiration
4	Integumentary system	The skin
5	Circulatory system	Heart, blood, and circulation
6	Endocrine system	Hormone glands
7	Muscular and skeletal systems	Muscular and skeletal systems
8	Nervous system	Nervous system—central part
9	Nervous system (continued)	Nervous system—special senses
10	Excretory system	Elimination of wastes
11	Embryology	Reproduction and growth
12	Genetics	Heredity
13	Pathology	Disease
14	Human ecology	Man and his environment

our attempts to make the titles dignified, dynamic, descriptive, and interesting. There is still room for improvement.

Coordination of lessons. We recognized that dismemberment of a subject into lessons often leads to analysis alone and not to synthesis. We had all come out of certain courses in our own student days in which we were taught a myriad "trees" and were left to gain the really important ideas concerning the "woods" while cramming for examinations. We sought to avoid unit treatment like this; rather we tried to present the topics necessary for understanding and then to coordinate them. With coordination in view, I chose the cell concept to carry as a bonding core through all lessons. The cell was developed as the unit of structure, function, heredity, embryonic development, evolution, and ecology in man. It appeared in all 14 lessons. Other coordi-

nating devices were the expenditure of at least ten per cent of the time allotted to each lesson in reviewing and tying in the previous one or ones. In this connection we used one printed card listing the ten bodily systems near the end of the first lesson and at the beginning of almost every succeeding one.

Since it was rather certain that part of our audience each week had not participated in the previous lesson or not in the series at all, we did not allow ourselves to bank on cumulative effect of information. In order to be on the safe side and thus to encourage a new student to stay with us, key core ideas were expressed weekly (with varying points of emphasis) as a part of the review. Furthermore, effort was made to assure the integral value of each lesson, even when dissociated from all others by transitory viewer-listeners. The creation of lessons strong in inter-

relationship and also strong in individuality from point of view of showmanship was an engaging enterprise.

Planning a lesson. Once we had established the working basis of the broad aspects of the course, we turned to the planning of individual lessons. General practice during the telecast series was to start work on a next lesson no later than the day after that on which the previous lesson was given. In a preliminary session with the group, we first had to segregate what to give from what not to give since the lessons were each only 20 minutes in length. Needless to say, a continual contest was waged with time and facilities to see if we could successfully teach the fundamentals of both structure and function for the weekly topics. Almost always, my first

plan covered too much information in too great detail. Even after sifting such a first selection, I was amazed at how much could be included in a lesson and successfully taught by the new means. Sometimes we were limited in what we could incorporate because we were working in a television station some 40 miles from the campus. We would have been able to demonstrate certain features of both morphology and physiology more vividly with color television. Both color and campus location will improve the quantity and quality of instruction possible by television.

The lesson plan was composed of the title and two parallel lists. The left hand list contained technical details of televising the corresponding features of the lesson outlined at the

FLIP TO TC² LESSON 11

(Following showing of title cards and announcer's introduction).

Here is Dr. Lagler's eleventh lesson, Growth and Development

VIDEO

AUDIO

TC MALE REPRODUCTIVE
AND EXCRETORY

SYSTEMS
TC FEMALE REPRODUCTIVE
AND EXCRETORY

SYSTEMS
CHALK TALK
CLEAVAGE PHOTOS
PRIMITIVE STREAK

PHOTO
WHOLE EMBRYO PHOTOS
SIZE-TIME SYNOPSIS

PHOTOS
TC FACE DEVELOPMENT

TC PLACENTA-ROOT
COMPARISON

TC EMBRYONIC
CIRCULATION

TC EMBRYO IN UTERO

PLASTIC WHOLE
MOUNTS

CUT TO TC REGISTRATION
FOR
TELECOURSE 1

REVIEWS EXCRETORY AND REPRODUCTIVE
SYSTEMS

FERTILIZATION AND ZYGOTE FORMATION
DEVELOPMENT OF ZYGOTE, CLEAVAGE
FIRST FORM (BRINGS IN GUEST
SPECIALIST)

CHANGES IN FORM
SIZE OF DEVELOPMENTAL STAGES IN RELATION
TO TIME. THUMB BUSINESS FOR SIZE
SCALE

FACE AS EXAMPLE OF REGIONAL ORGANIZATION
AND DIFFERENTIATION
NUTRITION AND EXCRETION IN UTERO

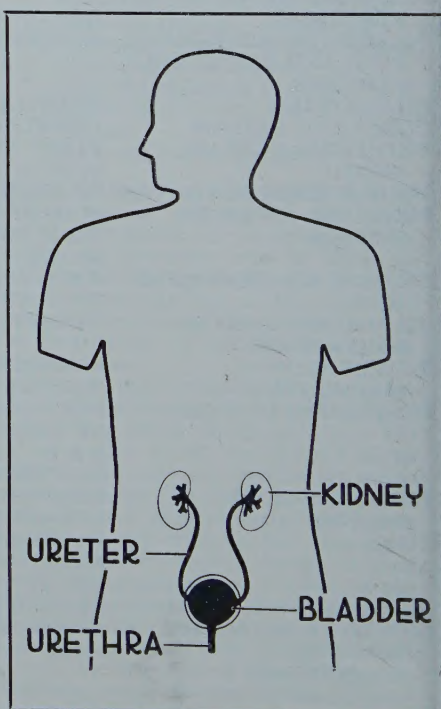
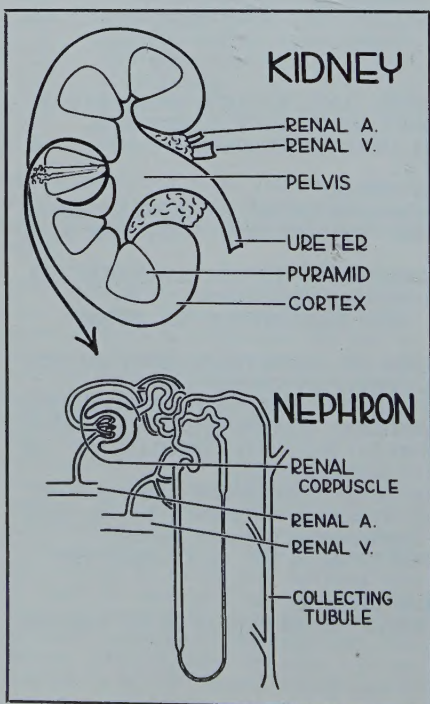
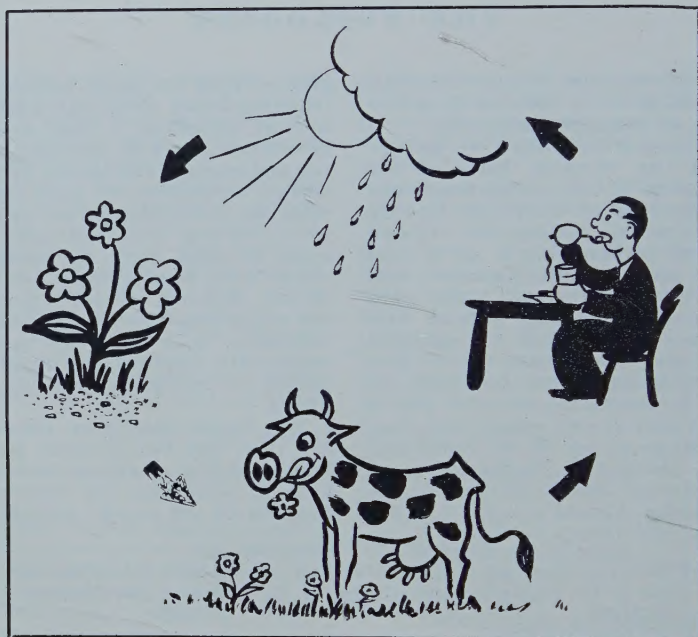
DISCRETENESS OF EMBRYONIC AND MATERNAL
CIRCULATORY SYSTEMS
FURTHER CLARIFICATION OF DISCRETENESS
OF CIRCULATIONS; PARTURITION; AMNION
AND AMNIOTIC FLUID (BREAKING OF
WATER-SAC); AFTERBIRTH

SIZE SERIES IN RE SKELETAL FORMATION;
QUICKENING. (One-inch to 12-inch fetuses with
some cleared and skeleton alizarin stained)
BRIEF ON TECHNIQUE OF PREPARATION
RECAP

NEXT WEEK'S LESSON

ANNOUNCER: Three lessons remain in Dr. Lagler's
series

² TC is abbreviation for Title Card and is used to include material shown in prepared card or chart form.



Sample charts used in television production showing technique for building entertainment value (above) and near maximum acceptable detail (below).

right. The preliminary lesson plan was the script of the performance and was altered when staging and timing took place. A sample follows.

In order to strengthen our presentation of factual material, for most lessons I brought in as a guest specialist one of my colleagues in the University. The basic idea here was to convey to the students the personal enthusiasm of another working biologist. He would help show and tell how the facts of structure and function in man are learned and how they are applied clinically for human welfare. We believe that the peeks behind the research and practical scenes thus provided substantially intensified the interest of students and pricked many a bubble of myth and superstition regarding the biology of the human organism.

Staging a lesson. In trying to determine what to include and what not to include, what to demonstrate as against what to describe, what to use in the form of prepared charts as against what to draw, I soon learned some important differences between a classroom among the ivied walls and one in a TV studio. First, and perhaps foremost, after an instructor has set the scene and the pace he becomes a much smaller part of the lesson on TV than he does in the regular classroom. Our motto soon became: show the subject, not the instructor, to the students. Consequently, we set our staging to move swiftly from the teacher to the thing.

Although there are limitations in the staging of certain classroom materials and demonstrations *via* television, they are by no means as numerous as I first thought they would be³. The safest assumption seems to be that it is possible to televise anything. No idea of merit should be discarded without actual testing—similarly, no idea should be assumed to be program-worthy until tele-screened. Among other things, we used with success histological sections of brain tissue showing neurons, well-stained blood smears, and sections of stomach wall; we broadcast heart sounds while

showing the stethoscope in use. We performed a basal metabolism test and the colorimetry of urinalysis; and we showed vividly the retinal changes in retinitis pigmentosa. Some of the foregoing histological materials were transmitted directly from microscopic preparations, using a microscope for extra magnification, and others were sent from 2- by 2-inch transparencies on film. With the aid of excerpts from movies (Erpi), we were able to give clear, animated, descriptions of such processes as the production and action of secretin, and excretion in the kidneys.

I was encouraged to emphasize the use of three dimensional properties in order to supplement movies, charts, slides, and diagrams. Often this involved apparatus such as the sphygmomanometer or whole preparations of the skeleton, brain, or embryos. At other times it included vegetables (to illustrate sources of common vitamins), a stack of bottles (to illustrate blood volume in man), or numbered billiard balls (to illustrate the fate of chromosome numbers in the two kinds of cell divisions which occur in the maturation of the sex cells).

Once a lesson had been staged, it was run through in the TV studio for timing and for camera drill. The television studio in which we worked had two cameras. When camera 1, say, was on my performance of lesson part A, camera 2 was usually setting up on lesson part B, and so on. In many ways the staging of a lesson resembles the series of sets used in a movie studio; but, since there are no stops between sets in a television performance, the whole operation requires interlocking, step by step arrangement. Here was the greatest surprise to my idea that I was going to be my campus-classroom self on TV. On campus, I move freely from chart or model to lectern and point swiftly here or there as emphasis or explanation require. I even backtrack when necessary to make up for professorial absent-mindedness. Such conduct would wreck a television lesson; it would be called "throwing

³ Suggestions of value in preparing and illustrating lesson material may be found in: Poole, Lynn. 1950. *Science via Television*. Baltimore, Johns Hopkins Press, xi+198 pp., illus.

away the script" and producer, director, and cameramen would be trying wildly to follow the performer's unscheduled starts, routes, and stops.

Staging yields a final check on the televisibility of props and routines and also gives a time check. Adjustments are made of final sequence and timing and the lesson is ready.

Now, should you be fortunate enough to give a television course as your full-time occupation, you may have plenty of time for rehearsals. We had no rehearsal time other than the staging run-through, yet we got by remarkably well. However, ease and confidence are built in the instructor with practice and he should take all of it that he can get (but not so much that all feeling of spontaneity will be killed in the actual presentation).

Televising a lesson. The bright lights are on you, the announcer makes his customary introduction, your viscera are in turmoil, you watch the screen of the monitor TV set to see the title card naming the course and you, the floor director stabs his finger at you, and you're on. For the first lesson you may have your notes before you as in a classroom. But soon, if not at the start, you will find it easy and convenient to work from a cue sheet or teleprompter machine in your view near the cameras. Chances are you will be very serious in your early lessons and the boys in the studio will work hard to get you to smile. And smile you must, if you want your students really to know how much you enjoy being with them; you may tell them so, but they'll never believe you if you don't smile now and then. "Yak it up, Doc," became the punch line used by our team to remind me to let my enjoyment in teaching spread to the audience.

Registration and follow-up. The University's Extension Service set up the mechanism by which students could register for this telecourse. The fee for 14 weeks in *Man in His World*—Human Biology was 2 dollars. For

this fee, the student received by mail, on the day after the telecast, a printed lesson on the subject. Included in this mail lesson (set in bookface type and reproduced by photo-offset) were text, several key charts and diagrams used in the television programs, and a supplementary reading list.

Four hundred and two students paid to register for the course and to receive the complete set of lessons. At the end of the series, students were sent an examination. Satisfactory completion of most of the examination earned for the student a Certificate of Participation. (See text fig.)

The mail-out lessons were of very great importance in the pedagogy of this enterprise. They helped create a closer bond between student and teacher and rounded out the classroom illusion which we were trying to make. They also enabled me to enlarge upon the information given in the telecasts by using extra examples and illustrations for teaching certain facts which on the air had to be limited to the single shot method. Furthermore, it was possible when printing some of the charts to add more detail to them than is acceptable for televising. For students desiring to probe more deeply into any subject, the reading lists were an important course addition made possible by the printed lessons.

The registration fees received from the students covered only part of the costs of preparing, printing, and mailing the lesson materials. The fee was a token device employed to assist students in applying themselves to the course by increasing their sense of responsibility through financial investment.

If teaching of skills and information are expanded by television along the lines of our telecourse series, the foreboding of University of Chicago's Robert Hutchins will not become reality: "Under the impact of television, I can contemplate a time in America when people can neither read nor write, but will be no better than the lower forms of plant life." (As quoted in *Time*, Feb. 19, 1951).

THE NATURAL HISTORY OF HIGH ALTITUDES

Given at the 1950 Phi Sigma National Meeting by DR. GORDON ALEXANDER

Alpha Pi Chapter, University of Colorado

When I was a graduate student at Princeton in the mid-twenties I once had the opportunity of hearing a lecture by a distinguished and well-known professor of literature from a neighboring institution. I expected to enjoy his lecture, but the first sentence so rankled in my mind that I was unable to hear anything else he said. His statement was an uncouth paraphrase of the beautiful first verse of the One Hundred Twenty-first Psalm. "I might lift up mine eyes to the hills," he said, "but I wouldn't drag my carcass thither."

I had just spent part of a summer in Colorado, and to one whose memories of first mountain experiences were still fresh, as were mine, the statement was revolting. The speaker's aim with this startling prelude was to get his audience to see that a place was not interesting if it were remote from man. Places were interesting to him only if the achievements of people, presumably in literature, had made them so. Biologists in particular, however, and especially those interested in good old-fashioned natural history, reject such man-centered bigotry. The biologist may, in fact, prefer nature uncontaminated by man. After all, man has fogged the atmosphere and covered the flowers with dust.

The interests of biologists in mountains began centuries ago. One of the first naturalists of the Renaissance, the Swiss Conrad Gesner, was a mountain climber. In a letter in 1541 he wrote "I have made up my mind . . . I shall every year climb a few mountains, or at any rate one, at the time when the flowers are at their best . . . my mind seems overwhelmed by the wonder of these heights and lost in admiration of their Supreme Architect."

His interests were perhaps more esthetic than scientific. Scientific investigations of high altitude natural history did, however, begin before the end of the Eighteenth Century. The first of these were in the Alps, and were carried on by naturalists of the region. It is not surprising that the Austrians and the Swiss have thus far made the most extensive contributions to high altitude natural history. They have been at it longer and have been more assiduous in their studies.

In this country sporadic contributions were made by naturalists of early expeditions, but organized exploration of high altitudes did not occur until after the settlement of the Mountain West, about 1860. Men like Charles C. Parry, botanist who collected for Asa Gray, and Samuel H. Scudder, who collected insects from the high summits of Colorado in the 1870's, typify the hardy breed of pioneer alpine collectors in this country. Dr. Parry collected several seasons (in the 1860's and '70's) in the headwaters of Clear Creek, in the mountains west of Denver. It was he who named Torrey's Peak and Gray's Peak, twin peaks at the head of one of the branches of Clear Creek. Thus two of the highest peaks in Colorado bear the names of leading botanists of the Eighteenth Century.

High altitude biological exploration, considering the world as a whole, is hardly more than in its infancy. The area of the earth's surface occupied by mountains and high table-lands is enormous. The altitudes involved are high altitudes, too. There isn't a continent, except Australia, which doesn't have mountains exceeding 15,000 feet above sea-level, an elevation higher than the highest mountains in the United States—if we exclude Alaska.

In at least two regions man himself has become so well adapted to high tablelands that he has domesticated high altitude animals as beasts of burden, the llama in South America and the yak in Asia. One can only hazard a guess as to the numbers of species of various types of plants and animals which occur at high altitudes. Of birds alone, several hundred species have already been recorded from altitudes above 13,000 feet, most of these from Asia and South America, but numerous species from North America, Africa, Europe, and New Guinea as well.

High altitude natural history is so complex that in this discussion tonight I must arbitrarily limit myself to certain aspects. Even if a catalogue of high altitude plants and animals could be given that would not be worth while. Furthermore, our discussion must be limited geographically. I should like primarily to discuss those environmental factors to which high altitude organisms, particularly terrestrial animals, must be adapted. My illustrations will be taken, for the most part, from the Colorado Rockies. One reason for that is, of course, my familiarity with that region. Another reason, however, is the fact that no section of this country contains such a large area of high altitudes. The mean altitude of Colorado is higher than the summit of Mount Washington, and the state contains 52 peaks over 14,000 feet above sea-level, a larger number of high peaks than in all the other states combined. The accessibility of much of this high country, coupled with the extent of area available, makes Colorado ideal for the study of high altitude ecology.

The assumption has thus far been inherent in these remarks that we all know what is meant by "high altitude." Unfortunately the expression is ambiguous. How high does an altitude have to be to be a high altitude? How high is a hill; how high is a mountain? Mount Washington is not so high as the Black Hills. The latter are lower than the Rocky Mountains, but the Rocky Mountains are not so high as some of the "hills" of India. These terms are purely relative, therefore, and give us no clues to altitude. On the other hand, is not the summit of

Mount Washington at a high altitude? In my opinion it is, definitely. I base that statement on the belief that a definition of high altitude, like that of a hill or mountain, must be relative. It cannot be expressed in absolute units of altitude.

We subconsciously recognize two factors that might be considered in defining high altitude, elevation in relation to surrounding lowlands, or elevation in relation to land that might exist at sea-level at the latitude considered. By either standard the summit of Mount Washington is at a high altitude. Biologically, we may say, a high altitude is one that is sufficiently elevated above the surrounding lowlands (actual or potential) to be characterized by annual (not merely temporary) differences in climate and in flora and fauna. By that definition any altitude sufficiently elevated to be characterized by an entirely different climate and a distinct fauna and flora is one which may be considered, ecologically, as high altitude.

Of course, some altitudes which meet this definition are not high enough to produce physiological disturbances in man's breathing. They are, therefore, not what are commonly thought of as high altitudes in aviation physiology. But no altitudes on the earth's surface are high enough to materially handicap respiration in probably the majority of living organisms. Other factors are limiting, not air density; hence, our general definition should not be based upon air-breathing vertebrates alone.

What are the environmental factors associated with high altitude; or, in more general terms, what are the factors associated with increasing altitude? These may most conveniently be considered under several subdivisions. I shall consider them as (1) climatic, (2) edaphic, (3) physiographic, and (4) biotic factors, and will take them up in that order.

In spite of the fact that I have not based my definition on air density the major environmental variable directly related to altitude is undoubtedly the decrease in air density and pressure with increasing altitude. A proper appreciation of this one factor makes it easy to understand all of the other variables associated with climate. They are the indirect results of this

one. The quantitative relations are suggested by some easily remembered figures. The air pressure in Denver is about 15% below that at sea-level. That on the summit of one of our peaks above 14,000 feet is about two-thirds that at sea-level. And the air pressure on the summit of Mount Everest is only one-third that at sea-level. The partial pressure of oxygen decreases with the decrease in total air pressure; and this, of course, is of significance for certain organisms—though probably not many. It does directly affect the distribution of birds and mammals, the former, with their more completely ventilated lungs, less than the latter.

The major climatic variables related to altitude are actually indirect results of decreased air density. In importance, the first of these is undoubtedly temperature. With decreasing air density the air absorbs less of the heat of the sun's rays, and the air temperature becomes progressively lower with increased altitude, whether in the free atmosphere or near the surface of the ground at high elevations. This decrease in temperature varies with angle of slope in mountains, but averages about 3°F. per 1000 feet increase in altitude, being less in winter and more in summer. With this average depression, an altitude in Colorado five thousand feet above the plains will have an annual mean temperature about 15°F. below that of the plains.

This effect is reflected also in the short growing season at high altitudes, —elevations occurring even within the tropics, of course, where a frost-free season is non-existent. The length of the growing season in the alpine tundra is so short that an organism characteristic of such regions must either complete its life cycle in a shorter time or be able to extend it over two or more seasons.

In general, Bergmann's Law seems to apply to warm-blooded animals which are non-migratory. Those individuals which live the year around at high altitudes average larger than those of the same species at lower altitudes. On the other hand, the reverse condition is true with such poikilotherms as insects. Flightless Orthoptera of wide altitudinal range demonstrate this clearly, the individ-

uals at highest altitudes being much smaller than those resident at lower elevations.

Variations associated with temperature immediately suggest a climatic relation between altitude and latitude, obvious to layman and scientist alike. Both the decrease in mean annual temperature and the shortening of the growing season are associated with increasing latitude as well as altitude. The initiation of events in the spring, postponed by altitude and latitude, has been quantitatively equated for these two geographic variables. The Bioclimatic Law of A. D. Hopkins expressed this relationship, the lag of seasonal events according to this statement being, on the average, four days for each increase of 400 feet in altitude or one degree in latitude. This suggests, of course, that a mountain area 5,000 feet above the surrounding plains corresponds in temperature climate to a latitude 12°30' farther north. As a matter of fact, of course, the fauna and flora usually show such a correspondence.

Temperature is not the only climatic variable related to both altitude and latitude. Relative humidity, varying in relation to temperature, is another such variable. Naturally, as the average temperature decreases, if the total air moisture remains constant the relative humidity increases.

Not only is relative humidity higher (other things being equal) at higher altitudes than at lower ones, but precipitation will, therefore, be greater. In Colorado total precipitation at 11,000 to 12,000 feet in the mountains west of Denver is in the neighborhood of two and a half to three times that at Denver. In the White Mountains rainfall is more than twice as much on the summit of Mount Washington as in the surrounding foothills.

The form of precipitation differs with altitude, also. Since the mean average temperature is lower more of the precipitation will be in snow at higher altitudes, and with a longer period of cold the ground may be covered with snow for months, the blanket of snow increasing in depth until the spring thaw. Biologically, this white snow cover is associated in both arctic and alpine regions with the occurrence

in winter of mammals and birds with white pelage or plumage. Weasels, snow-shoe rabbits, and ptarmigan are such animals in the Colorado alpine regions.

The importance of snow is widely recognized in mountains as a source of water for agriculture, industry, and domestic use. From the point of view of ecology, it has major significance in another respect, frequently overlooked. This is as a soil insulator. Winter temperature studies in snow banks in the Colorado Rockies show us that snow five to six feet deep, which is exposed to the sun part of each day, never, except near the surface, gets so cold as the air. The temperature of the bottom layers of snow is normally just below the freezing point of water, and the soil surface in contact with the snow is no colder than freezing. Since large areas at high altitudes in Colorado have deep snow cover during most of the winter, while the plains are intermittently bare, this actually means that soil surface organisms may in some cases be exposed to colder temperatures at lower altitudes than high in the mountains. Insect eggs or larvae and the growing shoots of plants undoubtedly receive much protection from snow cover. Cold-hardiness as such may, therefore, be less a factor in the survival of organisms at high altitudes than their ability to adapt their life cycle to the shorter growing season and the average colder temperature during that time.

Thus far we have considered climatic factors that are related to altitude and latitude alike. When we consider those variables related to solar radiation as such, however, we find characteristics of altitude that differ from those of latitude. One of the most obvious of these is the length of the photoperiod. Day length in mountains is not a function of altitude. It is the same at high altitudes as low ones, though modified, of course, by the direction of valleys and ridges in relation to sunrise and sunset. The long summer day and the long winter night characteristic of the arctic have no equivalents in high altitude climate. This may explain some of the striking differences in the fauna, waterfowl in particular, for example, being abundant

in the arctic during the summer and relatively scarce at high altitudes.

There are other differences too, related to light. With decreased air density at high altitudes solar radiation contains a higher percentage of ultraviolet. This is demonstrated by the ease with which we become sunburned or tanned at high altitudes, even in mid-winter. Certain widely distributed insects have more color variations and brighter colors at high altitudes than at lower ones. The qualitative difference in solar radiation has actually been suggested as a basis for the color difference, although, so far as I know, there has been no experimental demonstration of this. Probably of more significance than the qualitative difference in solar radiation, however, is the total effect on the soil and other heat-absorbing surfaces—even the organisms themselves. Soil temperatures and the temperatures of the organisms at high altitudes rise rapidly on exposure to the sun, but conversely, and for the same reason, drop rapidly when the sun goes down or is concealed by clouds (and clouds are more frequent at high elevations because of the average higher relative humidity). The differences between soil temperature and air temperature are much greater at high than at low altitudes, and the range of soil temperatures is also much greater. Thus the organism which may in winter be protected from extremely cold temperatures must, nevertheless, be adaptable to a wide range of rapidly changing temperatures during summer months.

These sudden temperature changes result in rapid local changes in air density and thus increase air movement. The windiness of high altitudes is almost proverbial. It is primarily a result of the combination of low air density and high solar radiation intensity. An interesting aspect of this condition is the diurnal-nocturnal reversal in vertical winds. Since a mountain top heats up more rapidly in the sun than the surrounding plains the wind moves up the slopes during the day. The rapid cooling at high altitudes in the evening and radiation of heat through the night, however, cause the powerful down drafts that characterize

night winds in mountains. Since nocturnal insects are practically non-existent at high altitudes, because of the extreme cold at night, high altitude insects are seldom carried to low altitudes. Low altitude flying forms frequently occur at high altitudes, however, transported there by the rising diurnal air currents. Snow banks above timber line in the Colorado mountains commonly trap such forms. Winged carpenter ants, pentatomid bugs, plains grasshoppers and other insects of lower altitude have been collected from the surface of snow banks at elevations up to two thousand feet or more above timber line.

More frequent wind and greater wind velocity at high altitudes are associated with specific adaptations of structure and behavior. Orthoptera with abbreviated wings predominate at the highest altitudes. Lepidoptera cling to the substratum when it is windy, one high altitude moth in Colorado, which closely resembles lichens in color and size, clings tightly to the surface of rocks in the tundra.

Air movement has other effects, of course, perhaps more important physiologically than mere transport. Wind increases evaporation. On the other hand, you will recall that air at high altitudes has, on the average, a higher relative humidity than in the lowlands. Hence, evaporation is a climatic variable which we may not directly associate with altitude. Under certain circumstances, i. e., where air movement is great, as on exposed ridges, evaporation is probably greater at higher than lower altitudes. In protected areas, as in the spruce-fir forest, evaporation is probably much less than at lower altitudes. Local conditions, rather than altitude as such, therefore determine the rate of evaporation.

So much for the major climatic variables. Let us now briefly consider edaphic factors. One clue to these is given by the fact that high mountains are, in general, young mountains, and that the soil of high mountains is, therefore, raw soil. Fine soil is scarce at high altitudes. The ground is strewn with large ice-fractured boulders in the alpine areas of Colorado, and most of what might be called soil is there gravel or coarse sand. The rocks pro-

vide hiding places and runways for our most characteristic high altitude mammal, the pika. An arctic spider stretches its web between the boulders. The black butterfly, *Erebia magdalena*, drops into rock crevices when the wind becomes exceptionally strong.

The coarseness of the soil means that a smaller quantity of soil nutrients is available, too. This factor is particularly important for aquatic habitats. Cold water, derived from ice and snow and in contact only with rock or coarse gravel, does not dissolve out much mineral matter even when the essential nutrients are present. Thus, in two respects, high altitudes are distinctive edaphically. They provide abundant rock cover for organisms, but the coarseness of the soil is accompanied by lower availability of soil nutrients.

The physiographic factors are evident on a larger scale. The direction of a chain of mountains is significant for the surrounding lowlands, the direction of an east-west chain in temperate regions (the Alps, for example) inducing pronounced differences between the lowlands to north and south. Similar differences occur on the south and north-facing slopes of the mountains themselves. The decrease of temperature with altitude is, in the Northern Hemisphere, less on the north than on the south. On the other hand, a north-south chain like the Rocky Mountains or the Andes is characterized by pronounced moisture differences on the two sides. The prevailing wind in the Northern Hemisphere being west to east the west side of the Rockies receives more moisture than the east. The reverse condition is true south of the equator; hence the east side of the Andes has more precipitation than the west.

A physiographic factor more evident in a small area is the direction and angle of a slope. In the Northern Hemisphere, north-facing slopes may receive no sun in winter, while south-facing slopes may receive the sun's rays, at least part of the day, more directly than at any time during the summer. The heat absorbed by the soil is proportional to the sine of the angle of incidence of the sun's rays. Hence, a slope receiving the rays at an angle of 30° receives only half the heat it

would receive if the rays were vertical. Differences in soil temperature due to this factor are striking, especially in winter. In the foothills canyons near Boulder soil surface temperatures above 80°F. have been recorded on south-facing slopes when across the canyon, at the same altitude, snow banks persisted. The sun's rays did not strike the latter slope all day, while they met the south-facing slope at practically a right angle.

The difference in vegetation associated with this condition is obvious. In the Colorado foothills' canyons dense stands of Douglas fir cover north-facing slopes while scattered ponderosa pines occupy the south-facing hill-sides. The differences in the fauna, while less apparent, are nevertheless, equally striking.

Biotic factors which vary with altitude are, of course, indirect results of the other factors thus far mentioned. Plant distribution, an indirect result of the variables just mentioned, is directly influential on the distribution of animals. The complexity of the biotic variables precludes anything more than a brief reference to them.

In the Rocky Mountains of Colorado, two striking boundaries between plant zones occur. The lower of these in altitude is the lower tree line, a boundary between the grassland of the plains and the ponderosa pine of the foothills and lower montane regions. The upper is, of course, the upper tree line ("timber line"). Lower tree line is at about 6,000 feet and upper tree line averages about 11,000 feet in the mountains of northern Colorado. Both of these boundaries are readily recognizable but they are not always clear-cut, the trees occurring in pioneer patches, not in an unbroken row. The factors determining the positions of these boundaries are primarily climatic, important determinants being temperature, moisture and wind. However, edaphic factors are important, as the trees cannot invade a rocky area until it has begun to break up into soil. The direction of a slope is very important also, upper timber line on north-facing slopes being nearly one thousand feet lower than on south-facing slopes.

The flora between lower and upper tree lines is, of course, not uniform. It varies with altitude in such a way that in various ecological schemes vertical zones are recognized. The absolute characteristics of temperature and moisture, in combination with edaphic factors, are chiefly responsible for these altitudinal differences in the flora.

Although there is some disagreement among mountain ecologists on the extent of zones, their appropriate names, and their dominants, there is general agreement in the existence of such zones. For myself, I still find Merriam's Life Zone concept, in its application if not in its theoretical basis, as useful as any other classification of vertical zones in Colorado. In northern Colorado it is quite convenient to consider the plains Upper Sonoran and the area above timber line the Arctic-Alpine. While we are not generally agreed on the extent of the three intervening Life Zones, the lower montane forest is quite different from the upper, and these are in general separated by a third type of forest. This is the present condition, and ecologists are not agreed on its significance. The Transition Zone is represented by the shrub zone of the foothills, according to some, by the ponderosa pine and douglas fir forest, according to others. Those who accept the former view consider the latter trees characteristic of the Canadian Zone, and have no distinctive place in their classification for the mid-montane altitudes in which lodgepole pine and aspen predominate. I find it most convenient to consider the latter trees as representative of the Canadian Life Zone. The moist spruce-fir forest above 10,000 feet is comparable to the Hudsonian Life Zone. Thus five of Merriam's zones may be recognized in the range of altitude present in northern Colorado.

This is but a general illustration of what I have called the biotic factor in altitudinal distribution of terrestrial animals. That there is a general correlation between animal distribution and these altitudinal plant zones is quite apparent. A series of species of birds in a single family illustrates this correlation. The lark sparrow nests on

the plains, the spotted towhee in the foothills, the gray-headed junco at mid-montane altitudes, the Lincoln sparrow in the sub-alpine region, and the brown-capped rosy finch above timber line. Each is, in a sense, characteristic of one of Merriam's life zones. Some animals are, of course, euryzonal, and those which are restricted to relatively narrow altitudinal bands may not be thus restricted by any physical factors of the environment. The critical determining factors in such cases may be purely biotic, the biotic factors, however, being secondarily determined in

every case by the physical factors which basically determine the differences in environment at different altitudes.

This has been a too brief summary of the features which determine the natural history of high altitudes. It may have served, however, to give you an idea of the major factors involved. I hope, too that it has suggested to you that our mountain laboratory lends itself particularly well to studies of a variety of ecological problems, and that such studies are potentially both stimulating and interesting.



Photo by Edward W. Milligan

Aspen, Colorado

Maroon Bells

The glacial lake in the foreground is at an altitude of 9,600 feet above sea-level; timberline is approximately 11,000 feet and both of the highest peaks attain elevations above 14,000 feet.

"An honest tale speeds best being plainly told."—Shakespeare, *King Richard III*

THE STUDIED AVOIDANCE OF SIMPLICITY IN SCHOLARLY WRITING

By EUGENE S. MCCARTNEY*

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Like Alice, countless persons have made "nice grand words to say" a part of their Wonderlands. Pedantic users of them have even become stock characters in novels, on the stage, and in the *New Yorker*. Unfortunately, overelaboration characterizes so much of present-day writing that it is not always recognized as a form of pedantry, and hence many authors regard it as an ideal to be imitated.

In order to show that both the studied avoidance of simplicity and the protests against pomposity are not recent developments but have a long history of over two millennia I have gathered together a few representative quotations concerning them:

"His words are beautiful and tall, but they bear no fruit."—Phocion making sport of Leosthenes; Plutarch, *Moralia*, 188.

"So likewise ye, except ye utter by the tongue words easy to be understood, how shall it be known what is spoken? for ye shall speak into the air."—I Corinthians, xiv. 9.

"What spekestow of preambulacioun?

What! amble, or trotte, or pees, or go sit down;

Thou testest our disport in this manere."—*The Canterbury Tales*. The Wife of Bath's Prologue

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"Telle us som mery thing of aventures; Your termes, your colours, and your figures,

Kepe hem in stoor til so be ye endyte Heigh style, as whan that men to kinges wryte.

Speketh so pleyn at this tyme, I yow preye,

That we may understonde what ye seye."

—*Ibid.*, The Clerk's Prologue

Armado. "Sir, it is the King's most sweet pleasure and affection to congratulate the Princess at her pavilion in the posteriors of this day, which the rude multitude call the afternoon."

Holofernes. "The posterior of the day, most generous sir, is liable, congruent, and measurable for the afternoon."—Shakespeare, *Love's Labour's Lost*, Act V.

"He was wont to speak plain and to the purpose, like an honest man and a soldier; and now is he turn'd orthography; his words are a very fantastical banquet—just so many strange dishes."

—Shakespeare, *Much Ado about Nothing*, Act II.

"Why, Dr. Johnson, . . . if you were to make little fishes talk, they would talk like WHALES."—Goldsmith, as quoted in Boswell's *Life of Samuel Johnson*.

"Neither shall I pretermitt or postpone your honour's commands, but speedily obey them, and that without delay."

"Worthy sir," said Tomkins, in a much less periphrastic style, "I will obey your worship as far as the spirit will permit."—Scott, *Woodstock*, Chap. XIV.

"And whenever he spoke (which he did almost always), he took care to produce the very finest and longest words of which the vocabulary gave him the use; rightly judging, that it

was as cheap to employ a handsome, large, and sonorous epithet, as to use a little stingy one."—Thackeray, *Vanity Fair*, Chap. LVI.

"I *ken* write long-tailed, ef I please."
—Lowell, *The Biglow Papers*, Second Series.

"He uses a cannon to shoot a sparrow."—Chinese proverb.

The lovers of long words are, then, strongly entrenched, and the task of ousting them will be one of the problems that, to quote an author, are "difficult to solve with facility." With the increase in scholarly investigation and publication the number of those who please to "write long-tailed" (Hosea Biglow) grows apace. In the last quarter of a century I have received manuscripts from almost every state in the Union, so that I say with assurance that the use of showy English is as widespread as the continent. I am listing here a sufficiently large number of examples (with corrections in parenthesis) to suggest the profusion of such English in manuscripts:

"An abundant amount" (an abundance); "the anterior and posterior ends" (the two ends *or* the front and back ends); "assumption of marital status" (marriage); "cabins conjoined by cabin walls" (cabins with party walls); "carcinophagous chelonians" (crab-eating turtles); "with less consumption of time" (in less time); "compiled an important accumulation of data" (compiled, gathered, *or* accumulated important data); "contributed to his demise" (helped to kill him); "created the possibility" (made possible); "established membership in" (joined); "industrial atmospheric pollution" (pollution of the air by industries); "in dealing with the measurement of eggs" (in measuring eggs); "in that eventuality" (in that case); "sufficient locational elements" (sufficient landmarks; "utilize for sustenance" (eat, feed upon); "was ineffective in causing" (failed to cause *or* did not cause).

A few complete sentences may perhaps, show more clearly the devastating effect of upholstering simple ideas:

"This fertilizer has the particular

virtue of killing cutworms." (This fertilizer kills cut worms.)

"The war has affected their availability" (They are scarce or unobtainable because of the war.)

"The materials were placed in twelve-quart measures for volumetric assessment." (The materials were put in twelve-quart containers to be measured.)

"Secondary disturbance of the burial was absolutely nonexistent." (The burial had not been further disturbed.)

"The distribution ratio of the new bulletin is one copy per farmer." (One copy of the new bulletin is available for each farmer.)

"The writer would like to inject a parenthetical statement to the effect that . . ." (I should like to say parenthetically that . . .)

"The semilunarity of the whole specimen was not satisfactorily demonstrable by the half." (One half of the specimen was not enough to show that the whole had been semilunate.)

"A combination of physical factors produces limitations to a variety of agricultural uses of the land." (Several physical factors limit the agricultural uses of the land.)

"Up to a certain point the approaching completion of the excavation by the fish accelerates the process." (As the excavation nears completion the fish is stimulated to hasten its work.)

"Many mammals have an extreme of dark brownish coloration." (Many mammals are very dark brown.)

"A charting of the hind-leg length of the two specimens as percentage of body length results in a range of from 1.0 to 1.5." (The hind legs of the two specimens are 1.0 and 1.5 times as long as the bodies.)

I am here giving the reader a chance to test his own skill and resourcefulness in simplifying swanky sentences:

"A strictly diagnostic evaluation of these pottery types in the context of culture classification has been avoided purposely, in anticipation of the broader synthesis which would be necessary for such an evaluation."

"This organic view prevents his predilection for classification based on the idea of the reality of clearly defined types and species from resulting in the hypostatization of absolutes."

Naturally many editors and writers are bitterly protesting against similar "outrages of polysyllables." I am quoting one such outrage that shocked a reviewer:

"The Pueblos, I suggest, in their philosophy and practice of the man-nature relationship, and in their ecological practice which makes of the human body a co-operant of the planetary and cosmical ecological creation, are the askers of a question and propounders of an answer even more universal than were the question and answer of Rochdale."

These quotations, especially the last three, enable us to appreciate much better the bewilderment of little Alice on a certain occasion: "It seems rather pretty, but it's rather hard to understand! Somehow it seems to fill my head with ideas—only I don't know exactly what they are!"

In an unguarded moment a confirmed user of lengthy words, Dr. Samuel Johnson, allowed a simply worded sentence to escape his lips, but he immediately rephrased it in polysyllables. He has modern counterparts, for several manuscripts from which I have quoted had been reworked to make them impressive. My fellow editor asked one author who was given to prolixity (and other faults) what he was going to do when he was on his own. He did not seem alarmed, for it is seldom that an inexperienced author gets buck fever, yet a few years later a reviewer wrote as follows about a book of which he was a coauthor:

"Unfortunately, the wealth of material is not matched by felicity of presentation. The authors are unmindful of, or unequal to, the special skills which go into a pleasing style. The book has little of the readability which would enlarge the audience for the material, which is in itself rich in interest."

Academic lingo, which may make books, and even entire fields of investigation, not only uninviting but repellent to the general reader with wide interests, helps to keep subjects narrowly departmentalized. In classical antiquity several men had the reputa-

tion of being polyhistor or polymaths. At present the best we can say is that "Knowledge in essence is a seamless garment" (R. B. Fosdick); in effect it is a patchwork quilt. We now feel unbounded admiration for a classical scholar who is a competent botanist or for a dean of a law school who has taught electrical engineering.

Big words are hopelessly out of place when they convict an author of insincerity or affectation or wastefulness or unwillingness to think out just what he does mean. Involved sentences are not necessarily a proof of involved subject matter or of profound thought. But a long word should not be avoided when it is the most apt one. Naturally one does not have to write so simply as to obviate the need for lexicons or to deprive the reader of the pleasure of consulting them. During Madame Chiang Kai-shek's visit to the United States in 1943 we were all glad to scurry to the dictionary to find out what she meant by "obtund" and "indehiscence." Doubtless most of us had to look up the meaning of "serendipity" last year when Sir Alexander Fleming, the discoverer of penicillin, used it at the dedication of a medical research foundation. But probably the pugilist who took a beating while "in a transom" had never enjoyed any successful bouts with the dictionary.

The act of putting ideas on paper seems to distort our perspectives, and we drag out the most grandiose words in our vocabularies. Simple ideas should be kept simple, and their innate strength should not be undermined by the use of big words and by periphrases. One of our youthful scholars said of a certain place: "Only a small part of all the inhabitants is visually encountered." Would our nation have been more deeply stirred if Perry's laconic dispatch after his victory on Lake Erie had been touched up in similar scholarly form: "We have visually encountered our adversaries, and they are in our possession"?

A real-estate dealer who wishes to dine and to have a roof over his head would not dare tell a prospective customer that a lot he has for sale is "in interstitial position between desirable locations," yet the author from whom

Mark Twain advises us to use the right word and not its second cousin. The right word, whether long or short, is the one that suits the time and the occasion. Emerson remarks that Skakespeare's "talents never seduced him into ostentation," though he does seem to love the pedantry of several characters in his plays. A great scholar who has molded his taste and judgment through reflective reading of literary masterpieces can discriminate between what he may say with propriety and what he may not say. The father of a friend used to read *Little*

Women to improve his scientific writing.

Although in general it is advantageous to express ideas in the smallest possible number of syllables as well as in the smallest possible number of words, an important argument in favor of certain long words with emotional appeal is made by Herbert Spencer in *The Philosophy of Style*. Not everyone would agree entirely with his selection of words to illustrate his ideas, but I am quoting for the reader's consideration his interesting explanation of the peculiar circumstances in which he believes polysyllabic words of Latin derivation have greater force than short ones:

"... A word which in itself embodies the most important part of the idea to be conveyed, especially when that idea is an emotional one, may often with advantage be a polysyllabic word. Thus it seems more forcible to say, 'It is *magnificent*,' than 'It is *grand*.' The word *vast* is not so powerful a one as *stupendous*. Calling a thing *nasty* is not as effective as calling it *disgusting*."

Spencer suggests that the exceptional superiority of certain long words may be due (1) to their carrying a suggestion of largeness or strength; (2) to the impressiveness made possible by the more emphatic articulation of several syllables at a time; and (3) to the longer time they keep the attention of the auditor. If Mark Twain's advice to "eschew surplusage" were more generally known, it might, perhaps, be more effective than "avoid needless words."

Long words may also prove to be proper and economical when we little suspect it. I once asked a five-year-old girl whether she knew about the five children who were born at one time in Canada. She said she did not. As I was trying to explain, at some length, she finally interrupted me: "Oh, you mean the quintuplets." A similar surprise was in store for a hostess who entertained Thomas Babington Macaulay as a child about four years of age. A while after a servant spilled hot coffee on his legs she asked him how he was feeling. He replied:

"Thank you, madam, the agony is abated."

There are, however, long words which, though they have legitimate uses, tend to divert the attention from the subject matter to themselves. One seldom gains anything by using "co-etaneously" (at the same time), "oligodynamic" (having little power), "ogdoad" (a group of eight), and "pediculicidal" (louse-killing). Occasionally, however, the last learned word may prove to be more decorous than its simple equivalent.

With the present great expansion of knowledge and the consequent demand for new words the resources of English, Greek, and Latin are being sorely taxed. To avoid cumbersome compounds we are now capitalizing many abbreviations. Examples are ACTH (adrenocorticotrophic hormone) and DDT (dichloro - diphenyl - trichlorethane). The same device is in common use for lengthy names of agencies, such as UNESCO (United Nations Educational, Scientific, and Cultural Organization).

This method of abbreviating has its serious drawbacks, for we cannot remember all the words and names so represented. A 126-page dictionary of abbreviations dated 1943 is already inadequate for editorial needs. A serio-comic protest against the system appeared in a weekly in 1948:

"It seems to me that we got along all right for a couple of centuries without the use of abbreviations. . . . Sometimes I get so fed up with SEC and UAW and DAR that I feel like K.O.ing the DF who started the fad."

In humorous writing polysyllables are sometimes both effective and legitimate, but an editor runs across so much unintentional humor of big words that he loses his appreciation of the intentional kind. I now see nothing funny in "terminological inexactitude" (lie) and "sublunary existence" (life) or in Charles Lamb's "indispensable side-intelligencers" (ears) and Bulwer Lytton's "somniaclular accommodation" (bedroom). I have outgrown whatever teen-age amusement I may have felt on reading Holmes' description of his new razor: "a reap-

ing machine, which gathered the capillary harvest of the past twenty-four hours. . . . It was, in short, a lawn-mower for the masculine growth of which the proprietor wishes to rid his countenance."

It takes more than ordinary cleverness, therefore, to make the humor of big words successful in the eyes of an editor. I like the trick of a wag-gish clerk who baffled an entire police department by reporting that a suicide had "defenestrated himself" ("dewindowed himself," that is, had jumped out of a *fenestra*, "window"). I also like the form of a request made at a mirthful dinner table: "Please pass the "indehiscent monocarpels." The guest may have run some risk of not getting what he wanted (unless he merely wanted to get a laugh), but people who like puzzles would have enjoyed this one.

Negroes are often successful with polysyllabic humor. My favorite example of their humor is the way one of them expressed his philosophy of life: "I avoids the impossible, and I coöperates with the inevitable."

The cause of simplicity in scholarly writing may, perhaps, be helped by exhibits showing the "achievements" of grandiloquence in other fields. In the Introduction to *The Biglow Papers*, Second Series, Lowell published examples of the way the reporter of his time injured our mother tongue "by stretching and swelling it to suit his occasions." The collection has doubtless effected some improvement in newspaper style, for it has been reprinted in several office manuals, and it must have served as a warning against similar locations. Since his list has some historical value and is also amusing, I am quoting six examples, with his simplifications following instead of preceding them:

"Was launched into eternity. Was hanged.

"Disastrous conflagration. Great fire.

"The conflagration extended its devastating career. The fire spread.

"Called into requisition the services of the family physician. Sent for the doctor.

"When the fatal noose was adjusted about the neck of the unfortunate victim of his own unbridled passions. When the halter was put round his neck.

"The chief magistrate of the metropolis, in well-chosen and eloquent language, frequently interrupted by the plaudits of the surging multitude, officially tendered the hospitalities. The mayor of the city in a short speech welcomed."

For such further help as is afforded by examples of what not to do we may look to Washington, which seems to be the capital of tumid English as well as of the nation. Early in 1942 these directions were given concerning blackouts in Government buildings during anticipated air raids:

"Such preparations shall be made as will completely obscure all Federal buildings and non-Federal buildings occupied by the Federal Government during an air-raid for any period of time from visibility by reason of internal or external illumination. Such obscuration may be obtained either by blackout construction or by termination of the illumination."

This was real news. Fortunately the story "broke" at an opportune time, since at that stage of the war the President and the country had very little to laugh at. Could a foreigner translate the paragraph without great loss of its tinsel and indirection?

An item from a metropolitan newspaper dated August 17, 1944, is also worthy of a place in this article:

"Instead of writing 'The forms are obsolete and should be consigned to the receptacles utilized in disposing of your daily accumulation of trash,' Federal employees are instructed to say it thus: 'Since your forms are obsolete, throw them away.'"

The sentence ridiculed may be only a parody on Government gobbledygook, but even so it would have some significance.

According to a clipping from a magazine, a sentence in the official British Post Office Guide reads thus: "Telegrams, other than Government, must be written in plain language."

If like cures like in the field of writing, there may be some remedial value in this elaborate parody of a well-known quatrain:

Scintillate, scintillate, globule orific,
Fain would I fathom thy nature
specific,

Loftily poised in ether capacious,
Strongly resembling a gem carbona-
ceous.

These lines are anonymous, and there is no indication whether the author was self-effacing or had been intimidated. A bureaucrat would have been proud of them.

Of course, ponderous speeches and writings are not total losses. As already noted, they provide material for novelists, playwrights, and humorists (and even for editors). An Emerson could find in them still another compensation. If all scholarly articles and books were composed in an equally distinguished style, no one could become outstanding as a master of English. As Seneca has observed, no tree can be singled out for admiration when the whole forest is of the same height.

In combatting the use of big words (alias "sesquipedalianism") one may quote from many advocates of simplicity who were themselves recognized as successful stylists. In an essay called "Style" Walter Pater gives this advice: "Say what you have to say, what you have a will to say, in the simplest, the most direct and exact manner possible, with no surplusage. . . ." A regret that men refuse to write in the most effective manner is to be found in Samuel T. Coleridge, "On Style": "If men would only say what they have to say in plain terms, how much more eloquent they would be!"

The ideal of an unusually successful writer, Antoine de Saint-Exupéry, is thus set forth in his enjoyable book, *Wind, Sand and Stars*:

"If anything at all, perfection is finally attained not when there is no longer anything to add, but when there is no longer anything to take away, when a body has been stripped down to its nakedness."

The reasons why simplicity is more effective than elaboration are clearly explained by G. H. Lewes in *The Principles of Success in Literature*:

"... The desire for Simplicity is impatience at superfluity; and the impatience arises from a sense of hindrance.

"The first obligation of Simplicity is that of using the simplest means to secure the fullest effect. But although the mind instinctively rejects all needless complexity, we shall greatly err if we fail to recognize the fact, that what the mind recoils from is not the complexity, but the needlessness."

Perhaps the pronouncements of doctors are an exception to this rule. Though they warn us of the perils of excess flesh, they may tell us in an overweight sentence that "excessive sedation causes disorientation."

Are the literature of power and the literature of knowledge (De Quincey's distinction) so inherently different that the simplicity and directness which make one great can seldom have a place in the other? Perhaps no one has ever spoken on this matter with greater insight than Lin Yutang in *The Importance of Living*:

"Simplicity, then, paradoxically is the outward sign and symbol of depth of thought. It seems to me simplicity is about the most difficult thing to achieve in scholarship and writing. How difficult is clarity of thought, and yet it is only as thought becomes clear that simplicity is possible. When we see a writer belaboring an idea we may be sure that the idea is belaboring him."

If good tales do speed best being plainly told, a number of scholarly reports could be transformed into good tales by ridding them of their cheap veneer. I have read some learned works that fascinated me as much as did "The Gold Bug" on my first reading of it.

I have been greatly impressed by several remarkable examples of simplicity in the field of aviation. Certainly the expressive phrase "to ride a radio beam" is not a scholar's coinage. During World War II an airplane man-

ufacturer who asked a squadron leader in the Pacific area what improvements were most needed was dumbfounded by the terse answer: "More speed and climb." The reply of an ace fighter from whom a lengthy technical explanation was doubtless expected was even more striking: "Something that will go upstairs faster." This picturesque remark was one of the considerations which led to the installation of the engine that was part of a new plane's unusual performance. "How forcible are right words [Job vi. 25]!"

Emerson found similar natural gifts of expression among simple-minded people whose vocabularies had not been spoiled by bookishness:

"It seems as if inflation were a disease incident to too much use of words, and the remedy lay in recourse to things. I am daily struck with the forcible understatement of people who have no literary habit."

In his little book *Beside the Bonnie Brier Bush* Ian Maclaren similarly describes the verbal restraint of certain villagers:

"Had any native used 'magnificent,' there would have been an uneasy feeling in the Glen; the man must be suffering from wind in the head, and

might upset the rotation of crops, sowing his young grass after potatoes, or replacing turnip with beetroot. But nothing of that sort happened in my time; we kept ourselves well in hand. It rained in torrents elsewhere, with us it only 'threatened tae be weel'—some provision had to be made for the deluge."

But long words were not hoarded for the vivid account of *the Deluge*; they would have spoiled one of the world's best short stories.

In my long editorial tenure only one author has ever told me that he tries to write in such fashion that his articles and books, which are on difficult subjects, will be understood abroad. Such an ideal of writing would make the results of research more readily understandable at home.

We are attracted to people who are simple, sincere, and natural, and we like simplicity in manner, dress, and speech. That is why even a hint of affectation or pomposity on the printed page repels us. The author who indulges in purple patches has but a losing office.

I have faith in the ultimate triumph of simplicity. "Now faith is the substance of things hoped for, the evidence of things not seen."



Our Immediate and Ultimate Objectives

Education must be purposeful, creative, backed by energy. There must be something immediate about it, but this nearby objective should be merely a step toward an ultimate goal so far away that you can see it only vaguely. . . . There are lessons which may be learned from the magnificent story of Ancient Rome—five hundred years of the Republic, another five hundred of the Empire, a mighty mistress of the world, maintaining peace wherever her eagles gleamed in the sun.

And then, as inexorably as darkness consumes the earth after sunset, the Empire crumbled; and Rome fell to the barbarian hordes. Rome fell, not because of the triumph of outside force; Rome collapsed spiritually, succumbing to the insidious poison of the idea

that the government could do all things for its citizens. . . . I hope you will be students of the positive values of America; that you will understand and think about the widening discrepancy between what the theory of democracy requires of its citizens, and what the practice of democracy reveals.

No other form of government demands such high intelligence, such public spirit, such virtue of its citizens. My fear is, that absorbed in our economic and social utopias, we are hurrying along to social ends which taken one by one may be desirable as tending to increase human welfare and happiness, but which added together may have sad consequences for human freedom.—Chancellor Deane W. Malott, University of Kansas.

SOME OPPORTUNITIES OF THE PRESENT-DAY BIOLOGIST

WALTER P. TAYLOR*

For some time your speaker has been suffering from an aggravated case of suppressed desires. These have to do with the sad state in which American biologists find themselves in the year 1950. In requesting him to address Phi Sigma you have conferred a boon upon his head, with what consequences to your Society remain to be seen.

"Some Opportunities of the Present-Day Biologist!" This subject puts practically no limits on what I shall say or how long I shall take to say it. Perhaps it is fortunate that my terminal facilities are pretty good. I understand it is terrible to be talked to death.

Although I shall not preach a sermon, I am going to take two texts:

First, Luke 10:7 "And in the same house remain, eating and drinking such things as they give, *for the laborer is worthy of his hire*. Go not from house to house." and

Second, Ps. 85:11 "Truth shall spring out of the earth; and righteousness shall look down from heaven." This you will recognize as the motto of Phi Sigma.

Taking off from these texts I would like to emphasize two of the numerous opportunities open to the present-day biologist, which seem to me important:

(1) To build up the self respect, integrity, and dignity of the biolog-

ical profession through common sense insistence that the laborer is worthy of his hire. Luke 10:7.

(2) To develop and utilize to the fullest extent our expanding biological knowledge for the benefit of mankind. Ps. 85:11.

And first, the laborer is worthy of his hire.

A recent article in Science (5, p. 349) records that

"In the office of Science Service there is a photograph that sums up all the exasperations and gripes of scientists about the use made of them in World War II. It is a picture of one of the young Science Talent Search winners, in army dungarees, cleaning out a garbage can."

Well do some of us remember that in World War I very little attention was paid by the Army to the biologist, or for that matter, to any other scientist, except possibly the chemist or the engineer who could manufacture and handle machinery and explosives. As a result, some of our most eminent scientific colleagues, whom time has shown to be brilliant scholars, competent research workers, and able administrators, spent their military service as high privates in the rear rank, and I am not sure about the applicability of the adjective "high"!

The situation was handled a little better in World War II, but not very much better, as the above quotation indicates. One day I paid a visit to Robert F. Griggs, at that time Chairman of the Division of Biology and Agriculture, of the National Research Council in Washington. We looked out of the window, across the street to the offices of the War Department, and Dr. Griggs related the following incident.

During the early days of the last war, it appeared, the Army suddenly awakened to the fact that there was a need in the military establishment for some bacteriologists. A hurry call was rushed to a leading university,

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Cornell, I think it was. "Send us some bacteriologists!" Back came the answer: "None is available. You have all our bacteriologists already. They were drafted, and are now privates in the Army." That closed the incident, for it appeared that the Army was powerless to seek these men out, in its own establishment, once their classification was determined.

You have doubtless heard the story of Army classification methods which runs as follows: The classification officer, evidently a bright private, or corporal, or maybe a sergeant, asked the recruit, "Well, what did *you* do before getting in the Army?" "Worked for Dr. Pepper!" came the answer. "Put this man in the Medical Corps!" directed the classification officer.

I don't cite these instances so much in criticism of the Army as in recognition of a widespread lack of appreciation, on the part of the public at large, of who and what biologists are, and what they do.

How strange! for truly "Biology is everybody's field." Biology is as close to us as our own hearts. On our ability to function as biological entities, to secure proper food, shelter, air and water, to establish and maintain proper relations with the world around us, depend our comfort and indeed our very survival. Even the physics and chemistry which more and more crowd out the biology from our technical periodicals would have no significance whatever, to us, were we not alive.

We may well inquire why it is that the ideas of the general public on biological subjects are so hazy. Listen to William Morton Wheeler's comments:

Said he, "I estimate that at least 25 percent of all students graduating from our colleges have had the equivalent of an elementary course in zoology or botany. There must be many thousands of these young men and women in the country and yet, in a prosperous population of 110,000,000, the number with a vital and abiding interest in biological inquiry, even as an avocation, is extremely small. And in our universities, apart from the students preparing to enter medicine, the number indulging in advanced and

graduate courses in the science would probably shrink to zero if we failed to provide fellowships or to hold out to them at the end of a long pole that enshrouded bundle of hay, the doctor's degree . . ." (12, pp.121-122).

By way of further comment on this interesting and indeed, rather disturbing situation, Rogers (9, pp. 599-604) has raised the question whether we instructors are not partly to blame for the observed situation. He pertinently inquires, Do we make our courses interesting, especially to the non-scientific students? What do we want our future governors and other citizens to get from our courses? Facts and laws, or a friendly feeling toward science and scientists, and a delight in reading scientific books. Do we present so many details that the student comes out bewildered and confused, disliking us and our courses?

But to get back to our main theme. Not alone in the Army does the biological illiteracy of the general public become apparent, but also in our legislative bodies. This is the more serious in that from these legislatures and from Congress we derive support, in the main, for all our state colleges and universities, as well as for our federal and state governmental operations.

When a governmental administrator goes before a Committee of Congress to discuss the work of his unit what happens? Do the members receive him with courtesy? Do they try their best to ascertain the needs so that he may do the best possible job for the common good? Do they treat him like a gentleman? Unfortunately, not always. All too often the committee acts toward him as if he were a malefactor, or at least a designing conspirator on the make. But for whom do you suppose the strongest shafts of ridicule, the sharpest darts of criticism, are reserved? I'll give you two guesses. Yes, you're right—the research scientists! Repeatedly we have been told by our chiefs that they would rather take a beating than go before a Congressional committee and ask for funds for biological research.

Everyone will remember that La-voisier, the French scientist who put the chemistry of combustion on the

right track, was guillotined by the Terrorists in 1794. When his services to science were cited as grounds for mercy, the petition met with the reply, "La Republique n'a pas besoin de savants." I wonder, in an extremity, whether we would fare much better in the present day!

As an aside I think part of how this Congressional attitude is built up can be explained. A. Powell Davies, minister of All Souls Unitarian Church in Washington, D. C., one of the best known preachers in the United States, recently discussed this point (3, pp. 12-14). A Congressman, it was explained to him, suffers from frustration. He rarely gets the things done he wants to get done. He gets pushed around. Presently he wants to reverse the situation and do some pushing around on his own. The wretched administrators of the executive branch of the government, from Acheson on down, become his defenseless victims. Upon these he projects his frustrations, thus achieving considerable relief from his own embittered feelings, just as I am getting relief from my own suppressed feelings at the expense of you, my audience.

But where *are* the biologists in Congress and in the state legislatures? When Congress gets down to serious business, where are the students of a few years back who have taken courses in zoology and botany? Where are the informed members of Congress who will help the body as a whole to decide wisely in such matters as the public health and nutrition, land use, and the super-important matters involving the biology of the national defense?

In more than thirty years of service to the government departments, Agriculture and Interior, and to cooperating state universities in several states, I have met with not a single member of Congress and but one of two members of state legislatures who were interested and well-informed on biological concerns. Oh, yes, there is an occasional medical doctor, but what good does he do?

It is true enough that the people pay generous lip service to science, including biology with the rest. Indeed, the general public seems to possess unlim-

ited confidence in the ability of the scientist to produce sufficient food to care for the increasing millions of people in spite of the shrinkage of productive lands from approximately ten acres per person three hundred years ago to two acres or less per capita at present.

But ask the general public to support the work of the same scientist so that he can make an essential long-time study as to what should be done to produce said food. Ask the public to treat the scientist, in the matter of pay, as a laborer worthy of his hire. And here is the great paradox. With unbounded optimistic confidence in the ability of the scientist to produce the rabbit out of the hat whenever there is a food, a fuel, or water shortage, or any other really serious difficulty, there seems also to be equal confidence on the part of the public that the scientist can do all this without adequate equipment, without enough laboratory space, without an adequate library, without proper technical facilities, with severely limited stenographic and other clerical help, and with personal remuneration that a fairly successful football coach would disdain.

Perhaps some of you saw the letter from Dr. E. Bodewig quoted by R. P. Boas, Jr., in a recent number of *Science* (2, pp. 538-539). This dealt with the pay of the learned man. Dr. Bodewig, it appears, is a German mathematician living in Holland, who for years has been reviewing papers for *Mathematical Reviews*. Recently he resigned, and along with his resignation he sent a letter from which I want to read you a few extracts.

Nowhere in the world, explains Dr. Bodewig, do the scholar and the learned man understand how to secure the position and the pay that they deserve. I am astonished, he writes, that the low pay of the learned man has never yet been the subject of an investigation. It should be a task for the United Nations to look into it sometime, just as with the problem of labor and the problem of colonial peoples.

"If I had received for each review the fee that a lawyer would have re-

ceived for the same time and mental effort, I would have received 100-1,000 gulden for each review, and altogether about 30,000 gulden. What did I get? Nothing . . . I heard of a camp for German prisoners of war in Australia. The prisoners were allowed to *work* and were all paid. Well paid! But there were also teachers and professors there, who were giving valuable instruction to the other prisoners. These teachers were the only ones who were not paid for their work. In fact, at the end of the class they had to sweep out the classroom, since the students didn't do it."

A bookseller gets 30 percent commission, often 40 percent, for each book he sells, he who often cannot read a single line of the book. The learned man who wrote the book gets 10 percent.

"Do I have to remind you of the disgraceful fact that the compositor often gets more pay for setting up a book than the author gets for writing it?" Furthermore the compositor, he points out, gets his pay at once, whereas the author has to wait for an annual accounting.

Mathematical Reviews can pay the compositor, printer, paper manufacturer, paper dealer, etc. Only the scholars who write the reviews get nothing. Nobody in the world would think of asking a compositor, printer, etc., to work for nothing. Only among the scholars is this taken for granted—after all, why?

" . . . for their poor pay the scholars have to thank not only 'the world' and not only their own awkwardness, but also their colleagues," writes Dr. Bodewig.

A German professor invited the doctor to give a lecture at his university. To his great surprise, Dr. Bodewig discovered that with childlike innocence he had never thought of an honorarium. The invited lecturer had to pay all the expenses of the long trip out of his pocket. No plumber in the world would have expected as much from another plumber.

A scholar in the United States asked Dr. Bodewig, in the name of his institution, three or four questions about a problem with which his organization

expected to be seriously concerned in the next few years. "Instead of answering the questions, I asked him for a guarantee of \$2,000 (a lawyer would have asked much more). After that he didn't seem to need the answers."

"'Naturally' one does not use his science for making money (it would be terrible if a scholar did what everybody else takes for granted). But the exploitation of the scholar is one of the worst in the world. It is the modern social problem! Nobody bothers about it, not even the scholars themselves."

This concludes my references to the Bodewig letter.

It was of interest to me that one of the reasons why the East (i. e. India, etc.) distrusts the western world at the present time is that in our western society the man of learning is held in such contempt, and the man of wealth can purchase political power with so much ease (11, pp. 14-16).

At this point let me remind you of a quotation from William MacDonald, who, after discussing some of these points, said "Nothing can be more certain or less in need of demonstration than that the state of intellectual work will not improve unless the workers exert themselves." (6, p. 307.)

This then, to my way of thinking, is the first great opportunity of the present day biologist—To work, individually and with his fellows, in all practicable ways, to build up the self-respect, integrity and dignity of biologists. Increased social and economic competency in the profession would undoubtedly mean augmented serviceability. Is not the biological laborer worthy of his hire? For too long we have gone from house to house.

Perhaps at this point we should raise the question: Why should we be concerned about the biologists? What, frankly, do they contribute to the common life of mankind? In what ways do they or can they promote human welfare?

Admittedly this is a big question, the answer to which should, by rights, be a far more eloquent and inspiring one than I shall be able to give. But we can mention a few points, by way of illus-

tration, then everybody can go on in his own mind and fill in the gaps.

You will recognize that here we come to our second text, the inspiring motto of Phi Sigma, "Truth shall spring out of the earth, and righteousness shall look down from heaven." We shall have time, perhaps, to give momentary attention to the following, each one of which should properly be the subject of a comprehensive discussion: (1) Biologists and the public health; (2) biologists and the relations between the human sexes; (3) biologists and the application of evolution to human concerns; (4) biologists and the reign of natural law; (5) biologists and the feeding and shelter of mankind; (6) biologists and man's un-used potentialities; (7) biologists and the "whole man"; (8) biologists and the great plant-animal community; (9) biologists as men of affairs.

May we now examine the situation in each of these departments a little more closely with a view to checking up on some of the great truths of which the professional biologist is special custodian.

Let's start with a comparatively clear field, that of the *public health*, including, perforce, the health of man, of his domestic animals and some of the closely associated wild animals too.

Obviously for much of the foundation of public health work we must look to the professional biologists. These specialists, with their knowledge of the laws of heredity, their painstaking studies of parasites, carriers, the relations of chemistry and physics and biology, the close tie-ups between soils and nutrition, have furnished much, perhaps most, of the basis for management and practice.

Then let's go on to that *imperium in imperio* of human concerns, as William E. Ritter of the University of California called it (8, p. 231), the problem of the *relations between the human sexes*. What of that basic institution, the family? Kinsey and his associates (4, pp. 804) have shown the richness and importance of this field and how little, after all, we know about it.

Another phase of current thought to

which the biologists have an opportunity to contribute is that of the application of *organic evolution* to human concerns. We do not need to be reminded that tremendous harm has been done to the welfare of the people of the entire world by unbalanced and unscientific emphasis on the tooth and claw aspect of evolution. Survival of the fittest! As interpreted by some, this crass and unrelieved philosophic doctrine, plus an Adolf Hitler, equalled World War II. But many of our keenest biologists have pointed out, most recently, perhaps, Dr. W. C. Allee and his associates (1, p. 641, etc.) cooperation may be more important than tooth and claw competition. Where *groups* of animals are involved in the evolutionary process, the fittest may be those who can work together most effectively. "Fitness involves cooperation" in the words of Allee and his associates, "and adaptations leading to coordination of parts of organisms and of individuals in populations are the result of evolution through natural selection." Note also, that, in view of the unfavorable environmental factors with which man must contend increasingly as his numbers expand, it may well turn out that on man's ability to cooperate with his fellows, all over the world, may depend his survival as a species. The professional biologists have a large responsibility and opportunity to help the human race win through to sounder thinking along these lines.

Again, the professional biologist, together with his scientific brethren, has a wonderful opportunity to stress the conception of the *reign of law in all human concerns*. The world is not a place of caprice or of chance. It is true that miracles are all around us, but they do not exemplify departures from the natural order. The natural order itself is the supreme miracle. From all we can find out, the processes of behavior, of spirit, and of mind, apparently are just as amenable to study as a part of nature as the physical manifestations of our universe. I don't mean to imply that unexplained variations, sometimes of an intermittent or even catastrophic character, do not exist. But nature and the universe appear to be basically de-

pendable. If it were not so, prediction, and science in general, would be impossible.

Another primary biological problem has to do with our *food and drink and living room*. Under this head come all our efforts to save the natural beauties of our lands and waters; to prevent the poisoning of our rivers and estuaries and atmosphere; and to insure the wise use of all the manifold products of nature, whether these be minerals, soils, waters, range forage in the grazing country, forests, recreational resources, wildlife, or human resources. As our world population sky rockets (it has already gone from less than 500,000,000 in 1600 to more than 2,000,000,000 in 1950) human pressures on natural resources steadily increase. Ultimately, unless we are able to increase production or to sensibly regulate the human population, we shall starve. Already, it is estimated by the Food and Agriculture Organization of the United Nations that a third of the world is hungry. Note that the problems involved are largely biological, having to do with such ordinary concepts in our biological field as numbers, pressure on environment, limiting factors, food, breeding rate, vitality, shelter, access to the materials of living, behavior of individuals and of groups.

A number of clear-visioned leaders, including Ritter, William James, and others, have stressed the obvious truth that all organic beings possess, in all their parts and functions, *capacities for accomplishment*, for enjoyment, for progress and constructive service, far and away beyond those ordinarily used. Here is encouragement and hope for all! The good word must come chiefly from the professional biologists, although many other workers, teachers, preachers, and writers, have an opportunity to help.

The inspiring concept of the *whole man*, deriving, doubtless, originally, from the philosophers of thousands of years ago, constitutes a marvelous opportunity for the biologists. The analytical process is necessary and indeed essential, but full understanding cannot be reached without a synthesis as thoroughgoing and as penetrating as

the original analysis. After all, the *organism as a whole* is the thing, not the abstracted aspects, the split-off splinters, to which we give our attention in the specialized divisions of our science.

In a similar way, we strive to acquire insight into the distribution, behavior, properties, and needs of the biotic or *plant-animal community* as a whole. This ecological concept, an outgrowth of that of the organism as a whole, is biological in essence. In some respects the relations of plants and animals to each other are just as important as the materials of which they are composed. No plants or animals live in a vacuum. Many of our most practical problems, as human beings, can only be worked out as we study our relations to each other and to our organic and inorganic environment.

Seemingly the biologist is the essential custodian of information and principles of the very highest moment to the welfare of society. Should he not fit himself to interpret biological matters and biological phases of public questions to the general public? Sometimes, alas, we become so absorbed in our work, so disgracefully specialized, that we become like isolationists, almost sterile as members of a functioning democracy. Whitehead as protested the "trivialized professorial intellect" that results from excessive specialization. We can't blame politics altogether for some of the abortive results of excellent biological work. We can blame ourselves, for being such poor salesmen of our wares, such ineffective cooperators with our fellows.

Assuredly the student of life should be a human being as well as a biologist. In a democracy, at any rate, he is a sovereign voter, with a voter's responsibilities. If he does not communicate his specialized information to the general public on the biological phases of important public questions, who will do it?

I think few would deny that biologists are doing, in the main, an excellent job in the fields of their specialties. But with our kind of a government, should not every citizen, in-

cluding the biologist and all the other scientists, become, to a degree, a *cooperative earnest man of affairs?*

It's of interest, in this connection, that all through recorded history there are to be found, here and there, scientists, including biologists, who did assume, not only their specialized tasks in science, but also their civic responsibilities.

For example, the Greek Pythagoras, who died about 500 B. C., was not only a scientist and mathematician, but also a philosopher, religious prophet and statesman (7, p. 13). He is said to have possessed considerable political influence.

Another Greek gentleman, Empedocles, was a philosopher who lived in Sicily in the middle of the fifth century B. C. But he did not stop, apparently, with philosophizing, but became a healer. He was also a keen democrat and a leading politician. He overthrew the oligarchies in his native city and set up a popular government. At one time it is recorded that a kingship was offered him. This he declined, setting the example, perhaps, for our own George Washington 2,000 years later.

The Persian Avicenna, born in Bokhara about the year 980 A. D., was not only a physician, mathematician, and astronomer, but also a philosopher and poet. At one time he was the all-powerful minister at the court of a vassal prince.

The Spaniard Averroes, born in Cordova in the year 1126, was a medical man, philosopher and lawyer. He became a judge in Seville, and later governor of the province.

Leibniz (born 1646), a pioneer in mathematics, was a diplomatic representative at the courts of several German minor princes.

The French biologist, Lyonet, who lived in the early part of the eighteenth century, was by biological profession an insect anatomist. He was also a linguist and diplomat.

Von Haller (born 1707) a Swiss biologist, was elected to the municipal council of Berne and made a name for himself as a distinguished offi-

cial. His services as a councillor were much utilized by the authorities.

Our old friend Linnaeus was knighted in 1761. His coat of arms, designed by himself, carried the motto "To spread fame by deeds" (10, p. 24).

Harvey, (born 1578), discoverer of the circulation of the blood, was physician to two kings of England.

Malpighi, (born 1628) whose name is perpetuated in the malpighian tubules, was personal physician to Pope Innocent XII.

Goethe (born 1749) was minister of state to the principality of Saxe-Weimar.

Esenbeck, a German physician and botanist in the early nineteenth century, took active part in the labor movement of his day.

Cuvier (born 1769) became a peer of France.

Boussingault, who lived in the early nineteenth century, is eminent for his part in demonstrating the importance to plants of the soluble nitrates. Emigrating to South America he took part in the struggle by which Bolivia gained its independence.

It will be recalled that the great German physician Virchow (born in 1821), was interested in the three P's, Public Health, Pathology, and Politics. Throughout his life he was faithful to liberal ideas. He became a member of the Prussian Diet and found himself in constant conflict with Bismarck.

Endlicher of Vienna, Austria, author of *Genera Plantarum*, plead the government's cause before the rebellious students. They became embittered against him and he was driven out of Vienna.

You will remember that Purkinje, (born in 1787), who first used the term protoplasm, was a member of the Bohemian Diet.

In the early 60's Weismann, of germ plasm fame, worked for the union of the German states under the lead of Prussia. The City of Freiburg made him its honor citizen.

A liberal in politics, Mill (born 1806) was active both in the theory and practice of political economy.

Lyell, contemporary of Charles Darwin, was created a baronet in 1864.

Our own Davenport, of the Carnegie Institution of Washington, and his associates, seriously studied immigration from the standpoint of eugenics, and profoundly influenced the course of immigration legislation in the United States.

The case of Sherrington, English professor, may be of increasing interest to some of us in the next few months. During the last War he served as member of a committee studying tetanus. He worked in his laboratory day-times, at the hospital after hours, and in a munitions factory vacations.

One of the world's outstanding scientists and intellectual leaders was our own President Thomas Jefferson. Sponsor of exploring expeditions, especially the famous Lewis and Clark exploration to the Pacific Coast, Jefferson kept in touch with many phases of the science of his day. His early and potent influence in widening the cultural horizon of the new nation may easily have been as important as some of his other magnificent contributions to American History.

Dr. David Starr Jordan used to say: Wisdom is knowing what to do next; Knowledge is knowing how to do it; and Virtue is doing it.

Surely *Wisdom* suggests that the biologist, of which profession Dr. Jordan was so illustrious an example, has limitless opportunities for the service of his community. I haven't even mentioned the newer chemical and physical aspects of biological principles, atomic relations, biological warfare, but there they are waiting for us. Can't the biologist help to work out the wise course for humanity to follow? Nor should *Knowledge* of how to follow this course be an impossibility forever. Here, too, it seems to me, the modern professional biologist has an inviting and inspiring opportunity for service. Of course we long for, and perhaps should pray for, the *Virtue* that spurs the individual and the group to do the right thing.

Here, then, are the two great opportunities of the present-day biologist:

To build up the self-respect, dignity and integrity of the profession, through common-sense insistence that the laborer is worthy of his hire, and

To develop and utilize to the fullest extent our expanding biological knowledge for the relief of suffering, the promotion of the abundant life, and for the survival of mankind.

Truth shall spring out of the earth, and righteousness shall look down from heaven.

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PLASTIC—THE *UTILE DULCI* OF MODERN BIOLOGICAL LABORATORY TECHNIC

"If one views letters or any minute object through a lesser segment of a sphere of crystal or glass or other transparent substance, whose plane base is laid upon them, they will appear much larger and better . . ." Roger Bacon (1214-1294), "Opus Major", 1276.

By DONALD J. ZINN

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It might be said that Roger Bacon was a man of great foresight: nearly 700 years ago he may have had in mind the eventuality that glass or "other substance" would one day be used to magnify very small things. This has come true with the huge development of optical glass in the last century; glass that is used in everything from the smallest magnifying hand-lens to the largest telescope in astronomical observatories. It is only presently that the "other substance," transparent plastic, has appeared. Indeed, were it not for the tremendous pressure of prevailing advertising practice, the interest of industry in applying scientific method to greatly improved methods of manufacture, and of course, war influences, it is a near certainty that plastic manufacture would not have reached the level attained today for another fifty years.

By definition, a plastic is recognized as a material which is susceptible to deformation and is capable of retaining the new form. Thus, resins, both natural and synthetic, become plastics at some time during their manufacture.

Perhaps the most remarkable of all natural plastics is amber—material of special interest to biologists because insects have been preserved in it since the Oligocene age about 25,000,000 years ago. This substance is the dried and hardened resin of ancient conifers. While the resin was soft and fresh, various insects and spiders became entangled and embedded in it. Here they were preserved at once and forever

while the resin hardened slowly. It may be noted that this is much the same way that organisms are embedded in synthetic resins in the laboratory today. It is hardly necessary to point out that the time interval to complete the hardening process in laboratory preparations is considerably less!

Industrially, the art of plasticization simply refers to making a material into a plastic. According to Mason and Manning (1945), it is in this form that synthetic resins exhibit their outstanding properties and adaptability to numerous industrial applications. Organic materials which undergo plasticization and usually deplasticization in their applications, include most of the synthetic resin types, as; phenol-formaldehyde and urea-formaldehyde resins, cellulose acetate, nylon, polystyrene, acrylic acid, and polyvinyl copolymers.

In the field of Biology, the use of plastics may be roughly divided into two categories. The first concerns the employment of a transparent plastic as a permanent, colorless unbreakable, convenient medium for mounting *in toto* small invertebrates, embryos, and adults as large as eight or ten inches, as well as algae and some of the highest angiosperms. Cross and longitudinal sections of many large animals and plants can also be treated in this way. The second category involves colored plastic as a means of demonstrating the circulatory and similar tubular systems of all small animals. Two separate steps may be used to accomplish this latter technic: (1) injection of a

colored plastic into the selected system, and (2) corrosion of the soft parts of the injected animal. The original description of this method was presented by Puckett and Newmann (1940).

Of the several materials that have been described for making *in toto* mounts, there appears little doubt that the best is the resinous plastic, ethyl methacrylate. This material is known under the trade name of "Plexiglass." It has been found by extensive experimentation to be a great deal easier to handle than its close relative, methyl methacrylate ("Lucite"). These two acrylic resins are preferable to similar materials in being water-clear, fairly easy to handle, and in exhibiting the least shrinkage on attaining final form in the mold. Specifically, the process is one of polymerization. The animal or plant to be embedded is first completely dehydrated, and then introduced to the liquid monomer. The monomer is then slowly polymerized with heat and light until hard. Prior clearing of the object in xylol or oil-of-wintergreen is optional.

A summary of the methods used by Cole (1938), Hibben (1937), Puckett (1940), Carbone and Zinn (1942), Sheehan and Stewart (1947), and Strumia and Hershey (1947), is as follows. The liquid monomer is partially polymerized by heating over a hot-plate, the reaction being aided by the use of benzoyl peroxide as a catalyst. The object to be mounted is fixed, stained, dehydrated, and cleared in the usual manner, and is then infiltrated with the partially polymerized ethyl or methyl methacrylate. It is oriented on a hardened base in a stiff paper box, or in a glass or porcelain dish, and the mold is then allowed to harden (polymerize) completely. This may be accomplished under cover at room temperature in daylight, or more rapidly at a temperature of 38-40° C. under a 250-Watt infra-red, ultra-violet bulb. It may be necessary to use a vacuum pump to evacuate larger objects and insure penetration. After the solidified block is removed from its container, it may be polished by the ordinary methods used by the lapidary or the metallurgist. Plastic blocks may be worked like wood.

Another method for the production of biological materials embedded in plastic has been developed by Romaniak (1947) at Ward's Natural Science Establishment. This substance, a polyester resin, is called "Selectron" by Ward's, and is manufactured by the Pittsburgh Glass Company. Although the methods used in routine mounting of animals and plants in this material are simpler in many respects than those employed in running up various organisms in the acrylic resins, the end results are not quite as satisfactory. The chief reason for this is that the unsaturated polyester resins have a slightly yellowish hue, a cast which cannot be removed from the final product.

The method now in general use for "Selectron" has been described by Knight (1937), Strumia and Hershey (1944), and several numbers of Ward's Natural Science Bulletin. The specimens may be fixed in any of the usual fixatives, which then must be completely removed from the material before further work. The material is stained; acid carmine and haemotoxylin being particularly recommended. Since the intensity of the stain is increased by the plastic, allowance must be made by under staining the specimens. Dehydration first in alcohol, then in anhydrous ether is followed by transfer to the uncatalyzed monomer which is evacuated very slowly and carefully in a vacuum dessicator until a vacuum of 0.05-0.07mm. of Hg. is produced. A supporting layer of the catalyzed monomer is poured into a Pyrex dish or tray and allowed to gel at room temperature until it is sufficiently firm to support the specimens. This material is added in layers to the specimens which have been carefully introduced from the dessicator to the tray, each layer being permitted to gel before the next is added. After gelation of the top layer, the trays are placed in an oven to cure for approximately 2 to 4 hours, the heat being slowly raised from 100° F. to 250° F. The blocks are then removed and finished as described above for the methacrylate mounts.

A popular variant of this method involves the use of a material called "Castolite," defined as a clear, fast-curing thermosetting co-polymer resin

composed of a styrene-modified unsaturated polyester. It is manufactured by the Castolite Company in Kenilworth, Illinois, and is sold by both the General Biological Supply House in Chicago, and the Carolina Biological Supply Company of Elon College, North Carolina. The main advantage of this material lies in the relative simplicity of its processing, and in the rapidity with which structures or organisms can be mounted. With practice, a small specimen can be embedded in little more than one-half hour. It is perhaps the most economical plastic available for preserving organisms in whole or in part. The vista of possibilities for the use of this plastic was opened immeasurably by Kampmeier and Haviland (1948) who showed how Castolite could be used to mount more than 100 anatomical museum preparations, including: wet specimens, dry specimens, cleared injected specimens, corrosion specimens, wax specimens, and stained microtome sections of entire organs. One of the most successful modifications introduced by these anatomists was the substitution of the monomer for the clearing agent in their routine procedure.

Weers (1947) and Goodchild (1948) have contributed further suggestions for the use of this type of plastic, the former outlining a method for using it to mount dried insects, and to preserve the natural colors and textures of plants and flowers; and the latter devising a clever, economical type of apparatus to incorporate cover-glasses on routinely embedded chick embryos and small invertebrates for low and high power microscopic examination.

Other procedures that have been successfully attempted in an effort to provide more practical ways of preserving and handling the preparations which are commonplace in zoology museums and biology laboratories have been made occasionally, and are to be found in the literature. Among these is the work of Rosenberg and Friend (1949) who devised a way to mount Golgi-impregnated and Weigert-stained thick celloidin sections of brain and spinal cord in Ward's Bio-plastic ("Selectron"). An unusual feature here is the use of Plexiglass as a matrix for the

mount. It is noted that before final mounting of this material the celloidin was removed from the Golgi impregnations by dioxane but not from the Weigert-stained material.

Rosett (1934) introduced a method that has been generally overlooked for embedding soft animal tissue. Working with mammalian brains, he infiltrated the tissue with a solution of synthetic phenol resins. The embedding mixture was made up of 1 part saturated aqueous salicylic acid, 1 part sodium hydroxide, 302 parts phenol, and 112 parts trioxymethylene. When the specimen is embedded, heat polymerizes the resins and converts the specimens to bakelite. The difficulties of this procedure are chiefly the great amount of time required for embedding, and the explosive potentiality of the resin during its manufacture. The successful end result is the production of what is probably the hardest plastic yet devised for the embedding of any organism.

In 1949 Fessenden, published a comprehensive survey conducted by the United States Department of Agriculture on the development of methods for the preservation and exhibition of agricultural material. Although the methods described in this publication in great detail have been developed primarily for plants, many of them can be applied equally well to animals. Two general classes of embedding materials are treated: transparent vinylite mounting sheets, and methyl and ethyl methacrylates. There is an excellent section on methods of preservation of natural colors in plants before embedding them in plastic. This paper is also of primary importance because of the inclusion of a most comprehensive bibliography of literature in the field of plastics as used in the preservation of living organisms.

Finally, the plastic corrosion preparations will be considered. This is a process which has been utilized extensively by companies that prepare commercially the various animals used in secondary school and college zoology classes. The corrosion part of the process is an enhancement of a relatively old procedure.

Two substances have been used for this work: colored (red, yellow, blue, green) latex, and colored vinylite resins, Tobin and Zariquey (1950). The procedure in both cases is to inject the colored material (in liquid form) into a freshly killed animal through the circulatory, and/or respiratory, and/or excretory systems. The animal is plunged immediately into a preservative (10% formaldehyde) to assist both the hardening of the tissues and the injection mass. Teachers of comparative anatomy find the latex type of plastic injection the most valuable for demonstrations.

It is not difficult to use either latex or vinylite (vinyl acetate) for injection. Fill a 10 cc. injection syringe (metal) with the colored material that is to be injected, making certain first that the syringe and needle are dry, although this is not as necessary with latex as it is with vinylite. Insert the needle into the vessel and inject until the back pressure stops the syringe. A clamp that resembles the old fashioned "OK" paper clips can be used to keep the material in the vessels by being attached across the injected vessel in front of the needle before the latter is withdrawn. The animal, anything from an earthworm or lobster to a large dog or cat, is washed in running water, placed in formaldehyde, and is soon ready for dissection.

If a corrosion preparation is wanted, the excellent directions in Ward's Natural Science Bulletin (1947) indicate that the injected animal should be placed in fuming hydrochloric acid, 5% KOH, or fresh water at about 90° F. for removal of the soft tissue. Water has been demonstrated to give the best results, and it is advised that the injected animal should be placed in a covered stoneware crock or an ash can and kept in warm water for several days. At the end of this time, the well-softened tissue may be washed away under a fine stream of water. The remaining latex or vinylite cast is then dipped in commercial sodium hypochlorite bleach. It is subsequently washed with water, and may be dried or mounted in a jar containing 5% formaldehyde, using a backing of colored or clear sheet lucite or plexiglass. Embedding a vinyl acetate injected system

in transparent plastic results in a very useful demonstration preparation.

These three systems for making classroom preparations can be easily handled by the competent laboratory technician or the interested undergraduate. It is one more way of following the example of Louis Agassiz, the great teacher, who years ago offered the precept, "Read nature, not books; if you study nature in books, when you go out-of-doors you cannot find her."

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Abstwak on Wabbits

Oftimes we take the labors of the secretaries in the office for granted and smile knowingly when they hand back such quaint terms as "ruffled grouse" and the like. Could it be that they, too, have a sense of humor and can laugh both with us and at us?

Several months ago a secretary had to type, retype and after revision, type and retype a rather technical article on rabbits. This job done, it then fell to her lot to type, retype, etc., the abstract of this paper. Finally, the manuscript was pronounced satisfactory as was the abstract. Every letter and punctuation mark was in place. One would suppose that she would be more than fed up with the rabbit but having got the serious work accomplished, she submitted the following.

"This here manuscript is on the

widdle cottontail wabbits. Wabbits is widdle animals what live in the woods and wun and pway and hop and knock theyselves out hiding from bad men wit guns what twy to shoot the poor widdle wabbits. A wabbit has wong ears and a widdle white wump-patch what they sit on when wooking at the hunters. A wule to follow when in the woods is if it wuns wike a wabbit and wooks wike a wabbit, by golly, then it is a wabbit! Widdle wabbits wike cawwots and cabbage, but only when it's in somebody's garden. They is hunted only in the fall or else they would all get shot and there wouldn't be no more widdle wabbits in the woods. But wabbits is very prowific and multiply wapidly, so they is always wots of widdle wabbits wunning awound.

"*Synwivagus transitionawis* is the scientwific name of wabbits wit cotton-tails. Some is good to eat and some has bugs. People gets the bugs from the wabbits if they eat 'em, so don't eat no widdle wabbits what has bugs. This is knowed as "tumeremaria," we think. Some people grow widdle wabbits, but this is cwuel cause the widdle wabbits has to sit in a widdle wire cage all day while other widdle wabbits can wun and pway.

"The mowal of this abstwak is: Wild-wife agencies ought to twain wabbits to wun faster to get away from the hunters so they won't get extink."

—Wildlife News, No. 35. Nov. 1950.

A Free Fellowship

Humanity is under no compulsion to abdicate in order to continue its onward march. The peace we aspire to would be a poor pretense if we thought to build it upon the repudiation of science, the restriction of teaching, or the placing of culture in leading strings. On the contrary, UNESCO is fighting for a fellowship of free men, a fellowship of human beings capable of full self-expression and genuine self-realization. It is only with men thus worthy of the name of men that we shall be able to assure a true peace.—Jaime Torres Bodet.

EDITORIALS

(This month we devote this section to a vital message — THE EDITOR)

Secretary of Commerce Charles Sawyer has provided a service to help the public guard voluntarily against the harmful release of technical information, even though it is not subject to formal security restrictions.

The Office of Technical Services of the United States Department of Commerce will receive requests for advice as to whether specific technical data should be disclosed, withheld, or given limited distribution. OTS will obtain expert opinions from the interested departments and agencies of the Government and inform the inquirer accordingly.

As an industrialist, businessman, scientist, public official, or private citizen, you are invited to use this service whenever you question whether technical information in your possession should be disclosed. It is then entirely up to you whether or not you act on the Government's advice. There is absolutely no compulsion for you to do so, since the program is entirely a voluntary one.

Requests for advice concerning the release of technical information, together with pertinent manuscripts, plans, or documents, if they are available, should be addressed to:

Office of Technical Services,
U. S. Department of Commerce,
Washington 25, D. C.

Your enclosures will be returned with the Government's comment as promptly as compatible with the problems of fact and judgment involved.

Before inquiries are submitted, the information in question should be considered in the light of the types of technical data and the circumstances with which the program of voluntary protection are concerned. These are discussed in the following pages.

The Government is fully aware of the dilemma presented by any limita-

tion, even though voluntary, on the flow of information among private citizens. Free exchange of information contributes to rapid progress in science and industry. On the other hand, all major powers depend on published data for a great share of their strategic intelligence. The present state of emergency, therefore, has directed attention to the security implications of imprudent release of technical information.

The Nation's interests can and should be served by voluntary protection of strategic technical information by private individuals and organizations. The program of voluntary protection is directed toward technical information which, if disclosed, would weaken the total position of the United States more than strengthen it.

The program of voluntary protection is not primarily concerned with information which is "classified" as restricted, confidential, secret, or top secret by the United States Government. Unauthorized disclosure of such information is forbidden under penalty of law. If a question exists whether certain information is classified, however, this OTS service is available to obtain specific advice.

The program is primarily concerned with unclassified technical information and industrial and commercial information of a technological nature. Information falling within the scope of the program includes unclassified technical data on:

Advanced industrial developments.
Production "know-how" and technology.
Strategic equipment.
Special installations.

Circumstances in which voluntary protection is invited are somewhat broader than indicated by this listing. The public itself, through inquiries which already have been made of vari-

ous Federal agencies, has showed its awareness of the dangers of divulging certain information. Those inquires illustrate certain categories of information regarding which the advice of the Government can prudently be sought:

A major railroad was asked to provide minutely detailed information on the physical lay-out of the system and an analysis of the flow over its lines. The stated purpose of the inquiry was to construct large maps of that and other rail systems. The railroad questioned whether the inquiry should be answered inasmuch as such a *set* of maps might constitute strategic intelligence of great importance.

A major oil company wanted advice on whether to publish a booklet showing the location of its storage facilities throughout the world.

A supplier of ordnance received a questionnaire from a broker with respect to his facilities for performing Government contracts. The questionnaire appeared unnecessarily detailed for its stated purpose.

A city official received numerous requests from unknown persons for detailed information concerning fire, police, and water department operations. He felt that such information in the wrong hands might be contrary to national interest.

A maker of electronics equipment asked whether a proposed radio broadcast on technological aspects of his products would be a security violation.

Inquires may also be made on the extent of release which may be desirable. For instance:

Should the information be given only limited distribution?

Should part of it be distributed if part is withheld?

What distribution could be considered prudent?

The Office of Technical Services, John C. Green, Director, was designated by the Secretary of Commerce to serve as a clearing house in the program of voluntary protection of technical information because of its experience in publishing technological information developed in Government agencies or obtained from other countries. For some time OTS has acted unofficially as a clearing house for miscellane-

ous requests of the types contemplated under this voluntary program.

In conducting this service, OTS will refer inquiries to one or more agencies expert in the particular field, assemble the comments, and forward the Government's advice together with any original materials submitted by the inquirers. But under no circumstances is a person who requests guidance required to accept the Government's advice regarding disclosure of unclassified information. Each individual possessing knowledge or information is the final judge of how best to serve the public interest.

It will not be possible to provide instantaneous service, but all inquiries will be answered promptly within the limitations imposed by problems of fact and judgment.

Representatives of private enterprises and other organizations, State and local officials, and private individuals are invited to utilize the OTS service in protecting unclassified technical information.

Nothing in this program is meant to stop industrialists and others who have regular contacts in the Government from using their usual channels when questions of security and the public interest arise. The Department of Commerce service, rather, makes it possible for persons who do not have direct contacts to obtain expert guidance from the Government on matters involving strategic technical information.

It is not contemplated that persons in a position to release unclassified technical information will normally call on OTS for guidance regarding release to known representatives of recognized scientific and technical journals, radio networks, press associations, and newspapers. Most of these organizations have wide experience in safeguarding such material. However, the service will be available to both the editor and the source of the material if they desire to use it.

The program of voluntary protection centering in OTS is concerned with information for release within the United States, which amounts to publication to the world. A separate service for the guidance of persons transmitting unclassified technical information directly to other countries is pro-

vided by the Office of International Trade of the Department of Commerce.

A special unit of OIT clears inquiries on the security implications of exporting unclassified technical data on *advanced* developments, technology, and "know-how"; on prototypes of such developments; on special installations; and on arms, ammunitions, and instru-

ments of war which do not have security classifications.

* * * *

In view of the current state of emergency, widest publicity as to the availability of both the OTS and OIT services is requested of those with the facilities or organizations and publications at their disposal.



The Concept of Truth

American colleges and universities must return to the concept of truth or fail this country in its hour of crisis. I am afraid that we educators are failing in our duty to work incessantly to discover the truth and teach the truth. The basic facts which form the very cornerstone of our American way of life are not being taught and that is why our adherence to that way of life today is more a matter of tradition and loyalty to our forefathers than a personal, abiding conviction alive and burning in our own hearts. American students are being smothered with vague, indefinite, intangible generalities.

America is built upon certain inflexible, "self-evident" truths which found their classic expression in our Constitution and Declaration of Inde-

pendence. . . . Fear of being considered dogmatic if colleges teach these democratic truths is based upon a misunderstanding. Tolerance is an attitude toward persons, not toward what we conceive to be wrong ideas. To say otherwise is to deny that one can have convictions, because to be convinced of anything is to be intolerant of any conflicting idea.

If a man declares that the world is flat, we can and should tolerate the man and even his expression of his belief, but it would be ridiculous to say that tolerance demands that we tolerate his ideas. The truths of democracy . . . must be freely and spontaneously embraced if they are to endure in the minds and hearts of men and women. —The Very Rev. Paul C. Reinert, S. J., President, St. Louis University.



Looking for Guidance

In this continent, but especially among the people of Asia and Africa, there are masses restless with energy, eager for expression, who are looking for guidance from any source. We must appreciate that our way of life is in competition with the ideology of Soviet Russia for the good-will and active support of these millions of people. Their decision and the subsequent course of world affairs will depend upon the material example set for

them and upon the concepts and ideas which they accept as characteristic and desirable in one way of life or the other.

Educational institutions, which have always been concerned with ideas, must seek out methods of relating them more effectively to the issues of today, suggesting solutions for the morrow. —Dr. Cornelis W. de Kiewiet, Cornell University.

NEW BOOKS

This section offers brief, mostly uncritical reports on the general content of recent publications in biological and related fields. Only the longer critical reviews will be signed. For quick location on library shelves, each notice will be preceded, wherever possible, by three groups of numbers, the first two of which will be the Dewey and the Library of Congress classified numbers respectively. The third group is the L.C. card number, for the convenience of Librarians.

HANDBOOK OF FRESHWATER FISHERY BIOLOGY, by KENNETH D. CARLANDER, Wm. C. Brown Company, Dubuque, Iowa, 1950, 281 pp., tables and appendix.

Published primarily as a quick reference work for fishery biologists this first edition is an extensive compilation of data pertaining to the age and growth of freshwater fishes of the United States and Canada. Limited sections on populations, catch per hour, yield per acre and egg counts are included. In addition three nomographs are provided for the determination of "condition factor" and one for the back calculation of fish lengths from scale measurements.

Seventy two species and sub-species of fishes are represented in the section on age and growth. These include most of the important anadromous species with the exception of the Pacific salmon, *Oncorhynchus spp.* Some data on various hybrid combinations are also presented.

The extensive bibliography of 1122 references should prove of considerable value to North American fishery workers as a guide to the original investigations.

In making these data available in a single volume, Dr. Carlander has helped fill in a very significant gap in present day fisheries literature.

GERARDUS C. DE ROTH

ANATOMY OF THE GORILLA, edited by WILLIAM KING GREGORY, Columbia University Press, New York, 1950, 259 pp., 116 plates, 11 tables, \$15.00.

QL737.P9G75 599.82 50-12799

This magnificent volume with its equally magnificent photographs, plates and figures is based on materials collected by Henry Cushier Raven during the 1929-31 Columbia University-American Museum of Natural History Expedition to Africa. The book opens with a biography of Henry Raven by Dr. Gregory. This is followed by Raven's "Regional Anatomy of the Gorilla," which forms Part Two of the work and covers about 180 pages. The balance of the work is rounded out by papers on the abdominal viscera and on the female reproductive system of the gorilla by Elftman and Atkinson; on the microscopic anatomy of the skin of the gorilla by William L. Straus, Jr.; on morphological observations by Adolph H. Schultz.

APPLIED NUCLEAR PHYSICS, by E. C. POLLARD and W. L. DAVIDSON, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1951, 352 pp., illus., figs., tables, charts, \$5.00.

QC776.P65 539.1 51-9274

This is the second edition of an original 1942 publication which was going out of date at the very time it was coming off the presses, largely because Fermi and his friends were already at work. In this volume the authors' aim has been to provide enough detail so their readers could "apply the techniques of nuclear physics to research problems with some facility." The senior author is Professor of Physics at Yale, while his confrere directs physical research for the B. F. Goodrich Company. Despite their key positions, they have produced a very readable as well as helpful book.

ATLAS OF THE SCALE INSECTS OF NORTH AMERICA, VOLUME V, by GORDON FLOYD FERRIS, Stanford University Press, Stanford, Calif., 1950, 278 pp., 107 fig., \$7.50.

QL523.C7F35 595.752 37-4591

Begun in 1938, the monumental 8 volume contribution of Dr. Ferris reaches its fifth volume with the appearance of this work, which describes and illustrates in very large full-page figures one hundred and three of the named species of the *Pseudococcidae*. As in previous drawing, one half of each insect figure represents the dorsal, the other half the ventral surface. Each species is treated under five headings: Synonymy, Hosts and Distribution, Habit, Recognition, Characters and Notes.

ATOMIC BOMBING, by SCIENCE SERVICE, William H. Wise & Company, Inc., 50 West 47th St., New York 19, N. Y., 1950, 186 pp.

UF767.S3 355.23 50-58268

Just how far the repercussions of the first shooting in Korea will go no one would care to predict. If the "bush fire there were to leap into a conflagration here," as someone put it, it is not improbable that books like this one will be badly needed. Unfortunately, the need will be over before these books are read and all the survivors can do will be to find what they *ought* to have done. Of all the books thus far produced, this seems to be about the best. It is not too brief—as some have been—nor is it too long, too windy, or too far above the average reader's head. In this last indispensability it is a tribute to the uncommon common sense of its editors and writers in Science Service: Watson Davis, Jane Stafford, Marjorie Vande Water, Sam Matthews and Wadsworth Likely.

BEEES, THEIR VISION, CHEMICAL SENSES AND LANGUAGE, by KARL VON FRISCH, Cornell University Press, 124 Roberts Place, Ithaca, N. Y., 1950, 119 pp., 61 fig., \$3.00.

QL569.F74 595.799 50-11058

This frail volume is well loaded with interesting information, not only for entomologists and for ecologists, but especially for students of animal be-

havior. The discussion of the various sense habits of the bee is lively as well as thought-provoking.

BREEDING AND IMPROVEMENT OF FARM ANIMALS, by V. A. RICE and F. N. ANDREWS, McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y., 1951, 787 pp., 227 fig., 58 tables, \$7.00.

Agr. 51-502

Dedicated to all who love fine animals, this fourth edition of a work which originally appeared in 1926 continues its objective as a manual of animal breeding. The chapter on reproductive mechanisms has been rewritten. New material has also been on artificial insemination, breeding efficiency, fertility and sterility, and a separate treatment of mammary development and lactation. Everett J. Warwick of the U. S. Department of Agriculture has contributed a chapter on the "Selection in Meat Animals."

THE CACTI OF ARIZONA, by LYMAN BENSON, The University of New Mexico Press, Albuquerque, New Mexico, 1950, 134 pp., 33 fig., 29 plates, 5 tables, \$4.00.

QK495.C11B35 587.471 51-93

Published first in 1940, the author's work was snapped up so quickly that it has been out of print for most of the decade that has intervened. In addition to the standard paraphernalia of a taxonomic work, this volume riots with good illustrations—five pages of them in color. For each variety there is also a 2" by 2" map of Arizona blocked in to show its distribution, which will be of ecological as well as taxonomic interest.

CHARLES DARWIN'S AUTOBIOGRAPHY, edited by SIR FRANCIS DARWIN, Henry Schuman, Inc., 20 East 70th St., New York 21, New York, 1950, 266 pp., \$3.50.

QH31.D2A18 925.6 50-10428

Here is a reprinting of the original Darwin work, together with a number of letters describing the progress of the writing of the "Origin of Species." George Gaylord Simpson, Chairman of the Department of Geology and Paleontology at the American Museum of Na-

tural History, contributes a prefatory chapter, as does Sir Francis Darwin, the subject's son. We have long wondered where the zany portrait of the great Charles came from. While it undoubtedly shows him in an unguarded moment, it certainly does no credit to him.

THE CHEMICAL FORMULARY, VOLUME 9, by H. BENNETT, Chemical Publishing Company, Inc., 26 Court St., Brooklyn 2, N. Y., 1951, 648 pp., \$7.00.

TP151.B35 660.331 33-36898

An impressive editorial staff has helped the Editor in Chief to accumulate, study, sift and select the formulae presented here which are all new. It is perhaps superfluous, but we cannot emphasize too much the importance of Editor Bennett's preface in which he this year emphasizes the possibility of two firms or groups using identically the same formula to accomplish different objectives.

CRYSTAL GROWTH, by H. E. BUCKLEY, John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1951, 571 pp., 169 fig., 88 plates, 31 tables, \$9.00.

QD905.B95 548 51-9338

Probably the first treatment of this subject in English to cover both the theory and practice of crystal growth, this book not only supplies the fundamental theories, but suggests the techniques for checking them. The twelve chapters discuss solutions, artificial preparation of crystals, the Curie theory, velocities of growth, diffusion and more recent theories, ideal versus real crystals, dissolution phenomena, modifications by impurities, mixed crystals and certain peculiarities of crystal growth. The author is Senior Lecturer on Crystallography in the University of Manchester.

THE CULTURING OF ALGAE, by J. BRUNEL, G. W. PRESCOTT and L. H. TIFFANY, The Phycological Society of America; G. W. Prescott, Secretary; Michigan State College, East Lansing, Mich., 1950, 114 pp., text fig. and culture formulae, \$2.25.

During the 1949 meetings of the Phycological Society of America held in New York City in December, there

was held a symposium on the topic which forms the subject matter of this book. In all seven papers were presented. The use of algae cultures in research was discussed by S. H. Hutner of the Haskins Laboratories. H. C. Bold of Vanderbilt University presented the problems in alga cultivation. E. G. Pringsheim of Cambridge University then took up soil water techniques. He was followed by a joint presentation by G. C. Gerloff, G. P. Fitzgerald and F. Skogg, who very thoroughly explored the requisite techniques for dealing with the *Cyanophyceae*. They were followed by a paper on algae culture in physiological research by J. Myers of the University of Texas. P. M. Cook, of Stanford Research Institute took up large-scale culture of *Chlorella*. The symposium closed with a paper on culturing of marine algae in morphological problem. Appended to all of these are six pages of algae culture media which may prove most helpful to those who are interested. All in all, this work should fill a much needed place on the shelves of our research laboratories.

DECIDUOUS FORESTS OF EASTERN NORTH AMERICA, by E. LUCY BRAUN, The Blakiston Company, 1012 Walnut St., Philadelphia 5, Pa., 1950, 596 pp., 95 illus., 90 tables, \$10.00.

QK938.F6B7 581.526425 Agr. 50-119

The retired Professor of Plant Ecology at the University of Cincinnati here presents the results of fifteen years and 65,000 miles of travel through the eastern half of the United States in pursuit of facts which can be found together only in this volume. The author's first purpose was to picture the *original* primeval forest type of each of the areas included in the study. Her second objective was the composition and aspect of the forest communities in all parts of the deciduous forest. The third objective was to trace the pattern of present forest distribution through geologic time. There are few forestry books with so rich a series of objectives.

DISEASES OF CEREALS AND GRASSES IN NORTH AMERICA, by ROBERICK SPRAGUE, The Ronald Press Company, 15 East 26th St.,

New York 10, N. Y., 1950, 538 pp., 81 fig., \$7.00.

SB608.G8S69 632.4 Agr. 50-482

The pathologist at the Agricultural Experiment Station at the State College of Washington here presents his contribution to our knowledge of the grass-infecting fungi. In this work he has wisely confined his work to the fungi alone and has omitted the smuts and rusts. It might have been a little more exact if his title for this work had come out and said as much instead of leaving it to a parenthetical tag on his title. After all, "Fungous (or Fungal) Diseases of Cereals and Grasses" would not sound bad.

ELEMENTS OF BACTERIAL CYTOLOGY, by GEORGE KNAYS, Comstock Publishing Company, 124 Roberts Place, Ithaca, N. Y., 1951, 375 pp., 49 plates, 21 tables, \$5.00.

QR75.K58 589.95 51-521

This is the second edition of this work which originally appeared in 1944. The original work has been expanded by the addition of a paragraph on deep colonies, partly rewriting the chapter on staining and the inclusion of later developments in the cytology of the spirochetes. The original chapter on cytoplasm and nucleus has been broken up into a separate one on each subject. Most important of all is the inclusion of a new chapter on the chemical composition of the bacterial cell.

EXPERIMENTAL PHYSIOLOGY, by MAURICE B. VISSCHER, ERNEST B. BROWN, NATHAN LIFSON; Burgess Publishing Co., 426 Sixth St., Minneapolis 15, Minn., revised edition, 1950, 126 pp., 46 fig., \$2.75.

This spirally bound photo-offset laboratory manual is a revision of the 1935 manual by one of these authors and Dr. Paul W. Smith. The range of the experiments for students or by faculty demonstration covers the general properties of protoplasm, mechanisms of muscular activity, circulation, respiration, nervous mechanisms, physiology of sensation, gastro-intestinal functions, nutrition metabolism and internal secretion.

FOREST PRODUCTS, by NELSON C. BROWN, John Wiley & Sons, Inc., 440

Fourth Ave., New York 16, N. Y., 1950, 399 pp., 153 fig., 26 tables, \$5.00.

SD541.B69 634.98 Agr. 50-465

No more authoritative voice could be heard on this subject than that of the Professor of Forest Utilization at New York State College of Forestry. Leaving out all lumber products, he has here endeavored to give a comprehensive summary of the harvesting, processing and marketing of forest materials including the principal derivatives, extractives and incidental products of the United States and Canada. The illustrations in this book are good and the comprehensive glossary is equally satisfactory.

THE FRESH-WATER ALGAE OF THE UNITED STATES, by GILBERT M. SMITH, McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y., 1950, 719 pp., 559 fig., \$10.00.

QK571.S6 589.3 50-11324

The original of this work first appeared in 1933, since which date so many new genera and species have been discovered that a new edition was postulated in order to keep up with the development of modern algology. New features include surveys of the Charophyceae, Cryptophyceae and Chloromadales which were not included in the 1933 edition.

GOETHE'S BOTANY, by AGNES ARBER, Chronica Botanica Co., P.O. Box 151, Waltham 54, Mass., 1946, 73 pp., \$2.00.

QK1.C55 581.4 Agr. 38-357

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Those who enjoyed Dr. H. H. Bartlett's article on "Goethe As A Biologist" in the Spring issue of this periodical will be interested in Dr. Arber's translation of "The Metamorphosis of Plants," which originally appeared in *Chronica Botanica* in the Summer issue of 1946 and which is available in separate form. This interesting bit of historical data contributes much to our knowledge of the part the great German poet contributed to the development of plant evolution, so much so that he was well called "The Poet of Evolution." For those who are interested, a little facsimile pamphlet in German of Goethe's verses on "Die

Metamorphose de Pflanzen" was reprinted from Schiller's *Musen-Almanach 1799*, and distributed by the Editors of *Chronica Botanica* for the members of the International Botanical Congress in Stockholm last July. Those who are interested in receiving a copy should write directly to the address given at the head of this announcement.

HANDBOOK OF ANTIBIOTICS, by A. L. BARON, Reinhold Publishing Corporation, 330 West 42nd St., New York, N. Y., 1950, 303 pp., \$6.50.

RS161.B3 615.329 50-11407

As far as this editor knows, there is nothing on the book market shelves quite like this volume. One hundred forty-two known antibiotics are approached here from six different angles. A notice of its first description precedes the treatment of the subject, which is then presented from a production standpoint, to be followed in turn by its chemistry if known, its bacteriology, its pharmacology, and finally its bibliography. Some of the lesser known or used antibiotics require hardly more than a page—in comparison with seven devoted to aureomycin, nine for polymixin, or twelve and a half for tyrothricin.

HEREDITY, EAST AND WEST, by JULIAN HUXLEY, Henry Schuman, Inc., 20 East 70th St., New York 21, N. Y., 1949, 246 pp., \$3.00.

49-50254

This is the noted British descendant of Thomas Huxley repeating his profession of faith in modern neo-Mendelianism. Like all professions of faith, it singles out some scientific heresies to be anathematized. Where there are heresies, there are apt to be heresiarchs,—and Trafim Lysenko seems to be slated to be burned at the stake in Dr. Huxley's modern witch hunt. It is all good fun,—if you are not in the U.S.S.R.,—and if you have never made the mistake of associating yourself with pro-Soviet propaganda in the days when it was "awfully smart" to be a pro-Soviet.

HETEROCYCLIC COMPOUNDS, Volume II, edited by R. C. ELDERFIELD,

John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1951, 571 pp., \$15.00.

QD400.E4 547 50-7589

This second volume carries on the work of the first in the series which covered the monocyclic compounds containing one oxygen, sulfur and nitrogen atom. This deals with the polycyclic five- and six-membered compounds containing one O or S atom. In its preparation the editor was assisted by Victor Meyer, William Parham, David Fukushima, Stanley Wawzonek and D. S. Tarbell.

HOW TO SURVIVE AN ATOMIC BOMB, by RICHARD GERSTELL, Combat Forces Press, 1115 Seventeenth St., N. W., Washington 6, D. C., 1950, 150 pp., illus., \$1.95.

UF 767.G39 623.3 50-11520

This little book is just the right size for lugging around in a coat pocket or handbag. It forgets all the theories of nuclear fission and cuts straight at the roots of the subject. The eleven short chapters that make up the book are grouped into five parts and an appendix. The first part, "For Everyone," gives preparations to be made; the second part is "For People Who Live in Apartments"; the third, for those "Who Live in Private Houses"; the fourth is "What we can all do together" and is devoted to civil defense. Part five sums it all up very nicely under the heading: "Keep Calm and Save Your Life."

HUMAN BIOLOGY, by GEORGE A. BAITSELL, The McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y., 1950, 730 pp., 361 fig., \$6.00.

QP34.B26 612 50-11326

This is a biology book for a freshman course built around the student himself. The idea is intriguing and undoubtedly must have a tremendous appeal, as this second edition in a ten-year period testifies. After preliminary basic chapters on life, protoplasm and organization, the author dives into his subject with twenty-three chapters covering the biology of nutrition, respiration, secretion, excretion, vascular system, skeleton, muscles, nerves, growth and reproduction, inheritance, heredity. The concluding chapters

cover the web of life and the biology of disease. There is a 154-page appendix of quoted material covering everything from abiogenesis to X rays which the author could not get into his main treatment of the subject.

IMMORTAL MAGYAR, by FRANK G. SLAUGHTER, Henry Schuman, Inc., 20 East 70th St., New York 21, N. Y., 1950, 211 pp., \$3.50.
R502.S5S66 926.1 50-9729

This is a well-written, but undocumented, popular life of Ignaz P. Semmelweis, the conqueror of puerperal (childbed) fever. Perhaps no more tragic figure ever crossed the world's medical stage. In his battle against stupidity, ignorance and prejudice he was fated to die of the very infection he was combatting.

INTRODUCTION TO AGRICULTURAL BIOCHEMISTRY, by R. A. DUTCHER, C. O. JENSEN and P. M. ALTHOUSE, John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1951, 502 pp.
51-9595

Based somewhat on the original Dutcher-Haley work of 1932, this new book by three members of the Agricultural and Biological Chemistry Staff follows a very logical plan. It begins in part one with general ideas like the history of agricultural chemistry and the chemistry of living matter, especially in its various physical states. This section is completed with separate chapters on the carbohydrates, the lipids, and the proteins, the enzymes and biological oxidations. The second part is devoted to the plant and its needs from germination through life. The third part is devoted to the biochemical processes in and required by farm animals.

THE INVERTEBRATES, Volume II, Platyhelminthes and Rhynchocoela, by LIBBIE H. HYMAN, McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y., 1951, 550 pp., 208 fig., \$9.00.
QL362.H8 592 40-5368

It has taken nine years for Dr. Hyman's second volume on the invertebrata to make its appearance after the

first volume came from the press. We are promised the third and final volume on the Acanthocephala, Aschelminthes and Entoprocta later this year. Definitely this volume was worth waiting for. Like its predecessor which covered the protozoa through the Ctenophora, each group is considered as a whole, not in relation to one type form. The good illustrations and the addition of ecological and physiological information are points worth attention.

THE ISOCORTEX OF THE CHIMPANZEE, by PERCIVAL BAILEY, GERHARDT VON BONIN and WARREN S. MCCULLOCH; The University of Illinois Press, Urbana, Ill., 1950, 440 pp., 293 fig., 40 plates, 3. brain maps in color.
QP385.B3 612.825 50-10849

With a modest disclaimer, the authors present this first general survey of the field as a summary of their research for those who come after the problem was undertaken originally at Yale in 1938 under the late J. G. Dusser de Barenne, after whose death in 1940 they were transferred to the Chicago laboratories of Neuropsychiatric Institute of the University of Illinois. This report embraces general considerations of growth and size, encephalometry, fissural patterns, cytoarchitecture, survey of serial sections, brain maps, physiological neuronography, electrical stimulation, suppression, relations of deeper structures and interrelations of cortical areas. There is also a discussion of the correlation of the chimpanzee with *Macaca Mulatta*.

LABORATORY EXERCISES IN GENETICS, by HOWARD A. ROYLE, 2nd Edition, published by the author at George Fox College, Newberg, Oregon, 1950, mimeographed, 48 pp.

The first edition of this work appeared a year ago. So enthusiastically was it received that the author was forced to publish a revised edition on 25 September 1950. This manual begins with a short but comprehensive laboratory reworking of elementary plant and animal morphology and then picks up *Drosophila*, which is used throughout as experimental material.

LABORATORY INSTRUCTIONS IN PLANT BIOLOGY and LABORATORY INSTRUCTIONS IN ANIMAL BIOLOGY, by JOHN B. PARKER and JOHN J. CLARKE; C. V. Mosby Co., St. Louis, Mo., 1950, 80 pp. and 110 pp., illus., \$1.25 and \$1.50 each.

This third edition of a previously reviewed manual has been separated into two parts in order to conform to the needs of those schools where one-semester courses in botany and zoology are offered instead of one course in general biology. Laboratory directions are all printed on the even-numbered (left) pages, the odd-numbered (right hand) pages being left blank for the drawings. The pages are perforated for detaching. A desirable feature would have been to have the sheets punched for a ring binder so that they could be kept for review purposes after the instructor's approval had been obtained.

THE LIFE OF VERTEBRATES, by J. S. YOUNG, Oxford University Press, 1142 Fifth Ave., New York 11, N. Y., 1950, 767 pp., 497 fig., \$8.50.

With all the thoroughness of the typical British or continental scientist, this book comes from the pen of the Professor of Anatomy at University College, London, who defines his objectives thus: "...there is no work that attempts to define the organization of the whole life and its evolution in all its aspects . . . there are no detailed works on the comparative histology or biochemistry of vertebrates. The present book has gradually grown into an attempt to define what is meant by the life of vertebrates and by the evolution of that life. Put in the old-fashioned way, this represents an attempt to give a combined account of the embryology, anatomy, physiology, biochemistry, paleontology and ecology of all vertebrates."

LIFE'S PICTURE HISTORY OF WORLD WAR II, by the Staff of "Life" Magazine, Simon & Schuster, New York, 1950, 368 pp., illus.
D743.2.L4B 940.53084 50-10501

The superb pictorial record of the war against the Axis, which was in a large part built up by the photographic

staff of "Life" magazine, has been levied on heavily by the editors of this new and permanent volume. Not all the pictures are from the "Life" files. Some came from the files of the Army and the Navy. The full-page text is by John Dos Passos. Since this is purely a military history, there are none of the sidelights which gave to research, biological, physical, chemical or medical, which went on during the war years. It was impossible for the editors to cope with all the features of the world conflict and United States participation in it and keep the book within manageable size. Hence there are many lacunae which will be easily overlooked by the reader.

LITTORAL FAUNA OF GREAT BRITAIN, by N. B. EALES, Cambridge University Press, 51 Madison Ave., New York 10, N. Y., 1950, 350 pp., 25 plates, \$3.75.

QL128.E34 591.921 50-11445

This collector's handbook will be a helpful guide to those American ecologists who are interested in the British fauna, whose environmental relationships are all too often forgotten in most of the anatomical and taxonomic literature. Of course, for those zoologists fortunate enough to plan a summer in Britain, this looks like what the doctor ordered. The biological stations offering seasonal courses or facilities for biological work are all listed, together with the probable collectible types of fauna.

MEDICAL ENTOMOLOGY, by WILLIAM B. HERMS, The Macmillan Co., 60 Fifth Ave., New York 11, N. Y., 1950, 643 pp., 191 fig.

RC115.H4 614.43 50-122.03

The first edition of this work appeared thirty-five years ago and proved desirable enough to warrant successive republications in 1923 and 1939. This fourth edition covers cockroaches and beetles, bugs, lice, gnats, mosquitoes, horse and deer flies, house flies, blood-sucking flies, myiasis, louse flies, fleas, ticks, mites and venomous larger arthropods. All of these are considered from the human and animal medical viewpoints. The treatment of mosqui-

toes and mosquito-borne diseases and their control take up three extensive chapters.

MICROBIOLOGY, GENERAL AND APPLIED, by WILLIAM B. SARLES, WILLIAM C. FRAZIER, JOE B. WILSON and STANLEY G. KNIGHT; Harper & Brothers, 49 East 33rd St., New York 16, N. Y., 1951, 493 pp., 70 fig., 11 tables, \$4.50.

This is an awful lot of bacteriology for the price, considering what other science books are costing. It is not alone the important positions of the authors in the Department of Agricultural Bacteriology at the University of Wisconsin that interests us in this new text. It is designed, first of all, for the general student—that undecided man-without-a-scientific-country. Secondly, its makeup is by all odds the most attractive of any bacteriology texts we have been in postwar years, with very readable, almost enjoyable, type and a number of really good illustrations.

THE MICROTOMIST'S VADE-MECUM (Bolles Lee), edited by J. B. GATENBY and H. W. BEAMS, The Blakiston Co., 1950, 753 pp., 8 illus., \$8.50.

Wherever laboratories operate and plant or animal forms are cultured, killed, dehydrated, sectioned, mounted, stained and studied, this internationally famous book is indispensable. It has been considerably revised, but the main features still stand. If we were asked to recommend a general manual for histological techniques either in classroom or for private or industrial laboratory use, this would be our choice.

MORPHOLOGY AND TAXONOMY OF THE FUNGI, by ERNST A. BESSEY, The Blakiston Co., 1012 Walnut St., Philadelphia 5, Pa., 1950, 791 pp., 210 fig., \$7.00.

QK603.B39 589.2 50-14993

This book is considerably more than the author's sixteen-year-old textbook on mycology, since the more or less traditional descriptive treatment of the anatomy, physiology and taxonomy of each group with its annexed bibliography is followed toward the end of

the book with fifty-one general or specialized lists of papers covering all phases of fungal taxonomy.

MYCOTROPHY IN PLANTS, by ARTHUR P. KELLEY, Chronica Botanica Co., Box 151, Waltham 54, Mass., 1950, 223 pp., 16 fig., 5 plates, \$4.50.
QK604.K4 581.55724 50-12598

Twelve lectures have been built around the rise of mycotrophic study, occurrence of mycorrhizae, fungal endophytes, fossil mycorrhiza, distribution of mycotrophic plants, mycothalli and mycorrhizomes, mycodomatia, structure of mycorrhizae, obligate symbiosis, theories of mycotrophy and mycotrophic phagocytosis. American botanists who affect to ignore or minimize the problems suggested by the mycorrhizae or connected there with are letting their European confreres run away with what may later prove an important and productive field of investigation as the 123-page bibliography of (mostly European) papers would seem to indicate.

NATURAL CHILDBIRTH, by FREDERICK W. GOODRICH, JR., Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y., 1950, 176 pp., \$2.95.

RG525.G55 618.2 50-11298

This is a practical, unemotional and uninhibited manual for expectant mothers—especially those who are about to become pregnant for the first time. The author has no propaganda to peddle, in fact he seems most dispassionate in his entire treatment of the subject.

A NATURALIST IN THE GRAN CHACO, by SIR JOHN GURHAN KERR, Cambridge University Press, 51 Madison Ave., New York 10, N. Y., 1950, 235 pp., 24 plates, 2 maps, \$4.50.

F2876.K4 918.2 50-9123

The author of these very interesting travelogues took them from the diaries he kept as a young man long before he reached the high positions he was to later hold in the University of Glasgow and at Cambridge. He made two different expeditions to the same upper branches of the Uruguay and Parana Rivers. The 1889-91 expedition brought

back birds, plants, Indian implements and photographs. The later expedition, 1896-97, had for its main objective the securing specimens of two of the lungfishes, *Lepidosiren* and *Protopterus*, and the ancient ganoid fish *Polypsterus* which still lingers in the fresh waters of tropical Africa. Kerr succeeded in his project as far as the first, *Lepidosiren*, is concerned. He had to leave the other two forms to another. However, he was more fortunate than most in that from his collections he was able to work out not only its morphology and physiology, but also its embryology.

NEMATOLOGY, by B. G. and M. B. CHITWOOD, published by the authors at the Catholic University of America, Brookland Station, Washington, D. C., 1950, 213 pp., 145 fig., 6 tables.
 QL391.N4C3623 595.13 50-34026

This is the second edition of a work which appeared in three parts—in 1937, 1938 and 1940. They have been combined in this atlas-type, two columned, 8½" x 11½" paged compendium. Since this volume is marked Section I, the author evidently intends to go through with his projected systematic section. The chance reader of this review should be warned that the 135 figures mentioned in the statistics given above should be loosely interpreted. Perhaps the authors would have been happier if they had called their figures "plates," since some of them include all the way from forty to seventy or more drawings.

THE NEW YOU AND HEREDITY, by AMRAM SCHEINFELD, J. B. Lippincott Co., Philadelphia, Pa., 1950, 616 pp., \$5.00.

HQ753.S33 575.1 51.9156

Those who are familiar with the original "You and Heredity" of 1939 will hardly recognize the outlines of the old book in this new one. Maybe somewhere in its pages they will come to a pause, one of those psychic experiences where one gets that puzzling feeling that brings, "I'm sure I must have been here before!" unbidden to the lips. But the new book is up to date, filled with the genetic equivalents

of chrome furniture, radar, deep freezes, TV and the Rh factor. A comparison between the 1939 and the 1950 editions of this very popular and justly appreciated work will convince the most skeptical that the world really has moved despite the second world war.

THE PACIFIC ISLANDS, by DOUGLAS L. OLIVER, Harvard University Press, Cambridge, Mass., 1951, 313 pp., maps and sketches, \$5.00.

DU22.06 990 51-9371

Sponsored by Peabody Museum and the Department of Anthropology at Harvard, this new work on the islands of Oceania will fill a unique place in our literature because it covers four very definite points,—the arrival of the natives and development of the cultures on the islands, the arrival of the white man, the changes produced by white dominion and, finally, the over-running of much of the islands by the Japanese and their conquerors in 1941. This is the first book to give any consolidated report on the results of World War II on native peoples.

PARASITIC INFECTIONS IN MAN, by HARRY MOST, Columbia University Press, 2960 Broadway, New York 27, N. Y., 1951, 231 pp., \$4.50.

Under the editorship of Harry Most of the New York Academy of Medicine, we are here presented with the collated reports of the symposium held at the Academy on 15-16 March 1949. The papers presented were: World Health Importance of Parasitic Diseases, by Russell; Significance of Findings on Malarial Parasite Life Cycle, by Huff; Immunological Mechanism in Parasitic Infections, by Culbertson; Immunological Diagnosis, by Bozicevich; Diagnosis of Intestinal Helminths and Protozoa; Growth and Metabolism of Endamoeba; Histolytica, by Frye; Physiology of Blood Flagellates, by von Brand; Biochemistry and Metabolism of Malaria Parasites, by McKee; Cultivation of Malaria Parasites, by German; Metabolism of Helminths, by Bueding; Pharmacological Evolution of Amebicides, etc., by Anderson; Status of Antimalarial Drugs, by Coatsney; Theory of Filariasis, by Brown;

and Treatment of Schistosomiasis by Brady.

PHYSIOLOGICAL HYGIENE, by CLEVELAND P. HICKMAN, Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y., 1950, 557 pp., 101 fig., \$5.15.
RA418.H46 613 50-14658

This third edition of a 1937 textbook by the head of De Pauw University's Zoology Department contributes a fairly dispassionate and scientific treatment of health problems for people at college age. As a textbook, it is as good as they come and a lot better than most in the field.

THE PIPERACEAE OF NORTHERN SOUTH AMERICA, by WILLIAM TRE-LEASE and TRUMAN G. YUNKER, University of Illinois Press, Urbana, Ill., 1950, 2 vols., 838 pp., 674 illus., \$10.00.
QK495.P67T69 583.9251 50-11405

Plant taxonomists throughout the world should purchase this beautifully produced set of volumes, not only as a testimonial to their respect for the late senior author, but also as an encouragement to the University of Illinois Press which has given this two volume monograph a most satisfying presentation. The Piperaceae are a fairly large group of plants, mostly tropical, with which the amateur gardener is not too much concerned. They have been a source of some interesting cytological data. For the benefit of those not taxonomically minded, the hot peppers of commerce, chili, cayenne and paprika are derived from the capsicums, mostly annual plants in temperate areas, although there are many of them perennial in the tropics. The black and white pepper of our tables are derived from one of the piperaceae, *P. nigrum*, which is really Asiatic, but occasionally escapes from cultivation and grows wild in Central America.

PLANT PATHOLOGY, by JOHN C. WALKER, The McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y., 1950, 699 pp., 194 fig., 3 tables, \$7.50.
SB731.W235 581.2 Agr. 50-488

Those who knew the plant pathology work which has been going on at the University of Wisconsin over the

past half century or more will be glad to know that the professor of that subject there has finally produced this long-awaited textbook. It is divided into a brief history of the subject, followed in order by chapters on the non-parasitic and bacterial diseases. Then the various fungal infectors are studies in order from the phycomyces to the basidiomycetes. Phanecogonic plant parasites, nematodes and virus infections follows. The book closes with chapters on environmental relations, and control methods.

POPULATION GENETICS AND ANIMAL IMPROVEMENT, by I. MICHAEL LERNER, Cambridge University Press, 51 Madison Ave., New York 10, N. Y., 1950, 342 pp., 42 tables, 36 fig., \$5.50.

Utilizing the records of hybridizing poultry for egg production that have been accumulated in Great Britain over the past fifty years, and checking them against his own more recent and elaborate experiments, the author presents his views on animal improvement and population genetics. It is of peculiar interest to members of Phi Sigma that the author pays this tribute to Dr. Jay Lush, Professor of Animal Breeding at Iowa State College, upon whose work much of this author's was admittedly based: "My indebtedness to Jay L. Lush cannot be expressed adequately by a short acknowledgement." Dr. Lush was National Vice-President of Phi Sigma from 1921 to 1923.

PRACTICAL HAEMATOLOGY, by J. V. DOCKIE, The Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y., 1951, 172 pp., 13 fig., 7 tables, \$4.50.

This little book is a guide to students preparing for the London University Diploma in Clinical Pathology. It omits all the purely morphological and medical phases which have no direct bearing on laboratory techniques and emphasizes the normal rather than the abnormal. The six appendices are devoted to formulae and methods. The ten chapters cover haematological techniques, measurement of erythrocyte diameters, bone marrow biopsy, haemolytic anaemias, blood groups and transfusions, etc.

PROBLEMS OF CYTOLOGY AND EVOLUTION IN THE PTERIDOPHYTES, by I. MANTON, Cambridge University Press, 51 Madison Ave., New York 10, N. Y., 1950, 316 pp., 279 fig., 8 tables, \$8.50.

Dr. Manton here sums up part of her twenty years of research in the comparison of the evolution of an ancient and modern group of plants. This volume refers almost entirely to the pteridophytes. The cruciferae are brought in only by way of comparison. As a result, the botanical world has a carefully documented story of evolution among the pteridophyta. The bibliography is extensive; the notes on cytological and photographic technique should be helpful as well as explanatory. The appendix of chromosome numbers is the most recent available.

SIR THOMAS BROWNE, by JEREMIAH S. FINCH, Henry Schuman, Inc., 20 East 70th St., New York 21, N. Y., 1950, 319 pp., \$3.50.

R489.B86F5 928.2 50.10750

Subtitled "A Doctor's Life of Science and Faith," this new life of the distinguished Tudor-age author-physician has much to offer for the mental security of our troubled age. Robert Browne came to maturity in an age when all the century-old ideas of Britain were crashing down under the assaults of shrewd and unscrupulous politicians, more interested in self-aggrandizement than they were in their country, its people, their economics and their religion.

THE SMUT FUNGI, by GEORGE W. FISCHER, The Ronald Press Co., 15 East 26th St., New York 10, N. Y., 1951, 387 pp., \$6.00.

No plant pathology library, however small, no botany library with any pretensions to completeness can afford to pass up this most valuable reference work. Its 387 pages are about evenly divided between the subject-matter guide to the literature on each species and the bibliography which lists exactly 3353 titles completely.

SOIL CONDITIONS AND PLANT GROWTH, by SIR E. JOHN RUSSELL, Longmans, Green & Co., Inc., 55 Fifth

Ave., New York, N. Y., 1950, 635 pp., 130 tables, 51 fig., 38 plates, \$6.50.

S591.A84 631.4 Agr. 50-489

This is the eighth edition of a British textbook which originally appeared in 1912 and has gradually won for itself an enviable position in the field of modern soil science. Sir John Russell retired from the directorship of the world famous Rothamsted Experimental Station in 1943. His son, Dr. E. Walter Russell of the Department of Agriculture at the University of Oxford, has brought this most recent edition thoroughly up to the minute.

SOURCEBOOK ON ATOMIC ENERGY, by SAMUEL GLASSTONE, D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, New York, 1950, 546 pp., illus., \$2.90.

QC776.G6 541.2 50-11014

Dr. Samuel Glasstone, who prepared this work for the American Textbook Publishers Institute, was selected for the task by the United States Atomic Energy Commission. In its preparation the author had free access to both the laboratories and the files of the Commission, members of which went over this manuscript carefully both for possible technical inaccuracies or accidental release of security connected information. This two-columned closely printed manual is the result. It contains "all that can now be told about the past, present and possible future of atomic science."

STRUCTURAL CARBOHYDRATE CHEMISTRY, by E. G. V. PERCIVAL, Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y., 1950, 246 pp., \$7.35.

QD321.P38 547.3 50-3911

Biologists in general may well be interested in this work, especially for the information it furnishes on the glycogens, but botanists will find it a valuable adjunct to all their physiological interests, since the results of all significant carbohydrate research up to September 1949 are included. While it will also have its appeal to chemists in general, those engaged in food chemistry will probably find it an equally important reference work. The author is reader in chemistry at the University of Edinburgh.

SURVIVAL UNDER ATOMIC ATTACK, National Security Resources Board, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., 1950, 32 pp., 10 cents.

This official government booklet is for sale in any quantity at a very reasonable price with full permission to reprint all or part of it *exactly* as in the original. The possibilities of atomic warfare are in the process of being better understood by all our people, but as in the case of all other forms of preventive medicine, there *can not be too much* of this sort of thing.

SYMPOSIUM ON RADIATION GENETICS, sponsored by the Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tenn., 1950, 210 pp., illus. and with tables.

This is a reprint from the Supplement 1, Volume 35, June 1950, issue of the "Journal of Cellular and Comparative Physiology," which was devoted entirely to the symposium held at Oak Ridge on 26, 27 March 1948. Among those presenting papers on the effects of radiation on heredity were H. J. Muller, Karl Sax, Newman Giles and Alan Conger, J. G. Carlson, L. F. Randolph, E. L. Tatum, O. Wyss, Felix Hass, J. B. Clark and W. Stone, Harold Plough, R. F. Kimball and Sewall Wright.

SYMPOSIUM ON THE STEROID HORMONES, edited by EDGAR S. GORDON, University of Wisconsin Press, 811 State St., Madison, Wis., 1950, 396 pp., plates, charts, tables, \$6.50.

QP551.W57 612.40082 50-12269

The twenty-three pages presented by a group of some thirty-four chemists and biochemists at the centennial celebration of the University of Wisconsin's foundation are here presented in book form. From a review of steroid research, their biosynthesis, metabolism and excretion, the list of titles ranges all the way through to the steroid hormones and sex determinations.

TEXTBOOK OF INTERMEDIATE PLANT SCIENCE, by GEORGE B. CUMMINS, GEORGE A. GRIES, SAMUEL

N. POSTLETHWAIT and FOREST W. STEARNS; Burgess Publishing Co., 426 South 6th St., Minneapolis 15, Minn., 1950, 220 pp., photo offset, 118 fig., \$3.25.

QK47.C896 580 50-12515

Designed to follow the traditional freshman one-semester course in botany, this textbook is divided into three main parts. The first deals with the classification and ecology of economic plants, while the second discusses their structure, and the third takes up plant diseases. The authors sum up the purpose of this work very nicely in part of their preface when they say: "This text is designed to enlarge upon these basic principles in such a way that the student either may continue in his study of the pure or applied sciences, or may apply these principles to enhance the benefits and pleasures derived from home gardens and parks."

THE TOXICOLOGY OF URANIUM, edited by ALBERT TANNENBAUM, McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y., 1951, 333 pp., illus., fig., diag., tables, \$3.00.

RA1231.U7T3 615.9 51-9388

This is the report on the toxicity of uranium based on the experiments conducted on the Plutonium Project. As such, it carries the Number IV-23 in the National Nuclear Energy Series, which should distinguish it from the two volume report edited by Doctors Voegtlin and Hodge which came from the University of Rochester Project and bore the Number VI-1. They were reviewed in THE BIOLOGIST Volume XXXII, Number 3-4, 1930. Since the topics are more or less identical and the fields covered are very similar, it is interesting to compare the two publications. A casual comparison of the contents reveals that much of the research reported in one volume is repeated at least partially in the other. There are even autoradiographs of uranium deposits in the kidney on page 713 in Voegtlin and on pages 153-159 in Tannenbaum. Fortunately, there are some items emphasized in one series of reports which are not so thoroughly explored in the other. Voegtlin is much more extensive, running to a total of 1084 pages, and could, therefore, be expected to cover more

ground. We note, however, that the group whose reports have been piloted by Dr. Tannenbaum have devoted more time to the distribution of uranium in bones, to its excretion from experimental animals, to injection of uranium compounds, as well as to much more use of uranyl nitrate.

WATER, LAND AND PEOPLE, by B. FRANK and A. NETBOY; Alfred A. Knopf, Inc., 501 Madison Ave., New York 22, N. Y., 1950, 342 pp., \$4.00.
TC423.F68 628.1 50-10432

Those who are interested in, alarmed by, or angry about water problems in the United States will want to read this latest contribution to the problem. Since there seems to be some divergence of opinion on governmental participation to large scale projects like the TVA and the MVA as favoring pretty strongly of state socialism, the casual reader may want to be cautious about books like this. Most people refuse to be convinced and carry away from their reading, as well as their conversation, just what they carried into it: "Convince a man against his will, he's of the same opinion still."

WILD ANIMALS IN CAPTIVITY, by H. HEDIGER, The Academic Press, 125 East 23rd St., New York, N. Y., 1950, 207 pp., 33 plates, 31 fig., 6 tables, \$6.00.

It will probably strike most readers of this book, or this summary for that matter, as a bit curious to consider the training of performing animals pretty much on the same plane as our human

competitive athletics, but this author makes out a pretty good case for his thesis. Seriously though, this work would repay study both by ecologist and by animal behaviorists. This is the first attempt by a trained zoologist to collect all the available information on the subject of the captive wild animal and its psychology.

HARVARD UNIVERSITY
THE BIOLOGICAL LABORATORIES
16 DIVINITY AVENUE
CAMBRIDGE 38, MASSACHUSETTS

March 1, 1951

Dr. Anselm M. Keefe
St. Norbert College
West DePere, Wisconsin
Dear Dr. Keefe:

I notice in the November issue of THE BIOLOGIST a brief review of our "Use of auxins in the rooting of woody cutting". This book is referred to as "no price listed". If the reviewer had looked on the inside of the first page he would have seen that the price is one dollar. We get a number of requests for this book and have to reply that it costs a dollar. I wonder whether you could insert a note in the next number mentioning the fact that the book is one dollar plus \$0.10 postage. This would help us greatly in the future. It might also be worth mentioning that the book has recently appeared in an enlarged form with supplementary tables which complete the bibliography up to date.

With many thanks for your cooperation,

Yours sincerely,
Kenneth V. Thimann

KVT/ebc



Our Mounting Expenses

There is a vague uneasiness abroad these days in the field of higher education. Inflated enrollments and inflated dollars have created serious problems. We face decreasing enrollments—this in itself may be a good thing. But decreasing enrollments combined with increased costs mean trouble. Our faculties have not been increased proportionately to the enrollment, hence we cannot cut the staff to

reduce costs. Nor can we increase tuition, for this will very likely reduce enrollment still further. Tax supported institutions simply demand more money from their government, and so go on building expensive structures and increasing salaries. Private institutions in America are doomed unless their alumni and their friends increase their gifts.—President C. Bergendoff, Augustana College, Illinois.

ASSOCIATION OF COLLEGE HONOR SOCIETIES

The 1951 annual meeting of the Council of the Association of College Honor Societies, held in the Illini Center at the La Salle Hotel in Chicago February 24 and 25, 1951, accomplished many worthwhile projects. Twenty of the twenty-one member societies of A.C.H.S. were represented. The meetings were presided over by Dr. Marsh W. White, President (Sigma Pi Sigma, physics, The Pennsylvania State College) with Vice-President Dr. George L. Webster (Rho Chi, pharmacy, University of Illinois, Chicago) as program chairman and Mr. Robert H. Nagel (Tau Beta Pi, engineering, University of Tennessee) as secretary.

Omicron Nu (home economics, represented by Dean Irma H. Gross, Michigan State College) and Kappa Tau Alpha (journalism) were voted into membership in A.C.H.S.

The committees on "*Constitution*" and "*Standards and Definitions*" jointly submitted a revision of the Constitution and By-Laws (definitions, standards and requirements for membership and functions of honor societies). The expansion of the Association and the need for more specific definitions and other terminology made this desirable. The revision, with several minor amendments made from the floor, was unanimously approved. Copies of the revisions will be sent to society representatives with the minutes of the meeting and the revised Constitution and By-Laws will be included in the 1951 edition of the Booklet of Information, which will be distributed next Fall.

The *Committee on Eligibility and Admissions* reported further progress toward expanded membership in the Association. A number of societies are being assisted in meeting A.C.H.S. standards. To further this aim, the president extended to certain honor societies an invitation to attend the meetings as observers. The following accepted and were present Saturday afternoon and evening and Sunday morning:

Dr. Paul N. Lehoczy of Ohio State University and Mr. James T. French of Atlanta, Georgia, (Alpha Pi Mu, industrial engineering).

Prof. Frank W. Stubbs, Jr. (Chi Epsilon, civil engineering), Purdue University.

Miss Peggy Iden, (Chimes—junior women), Ohio State University.

Dr. Frederick S. Youkstetter (Delta Phi Alpha, German), Northwestern University.

Prof. Donovan W. Brown (Omicron Kappa Upsilon, dentistry), Northwestern University.

NCCFS: Dean Robert W. Bishop, A.C.H.S. representative, reported on the previously held conference of National Conference on College Fraternities and Societies.

Costs of Membership: A survey of the costs of honor-society membership was made during the past year and a complete report was made to the Council meeting. This report was made from a complete survey among member societies (disclosing honor-society costs) and compared these costs with the cost of all fraternities (not including room and board) and societies as covered by a survey on one university campus. A further comparison was made by a survey through a member society, of the costs of all fraternities, sororities and societies to which its members belonged. The report indicated that honor societies are among the least expensive of the student activities on the American college campuses.

Round-Table Discussions were held on the following subjects:

a. Experience on the use of officers' manuals.

b. The effectiveness of local honor society councils, scholarship days, etc.

c. Emphasis on the use of "honor society" rather than "fraternity", "honorary fraternity", etc. It is becoming more and more general usage that "fraternity" or "sorority" be confined to use with social and professional campus organizations; that "honor

REPRESENTATIVES OF MEMBER SOCIETIES
AT MEETING OF COUNCIL OF A.C.H.S. FEBRUARY 24, 25, 1951



Sitting, left to right: Dean Adele H. Stamp (Alpha Lambda Delta); Mr. Robert H. Nagel, secretary-treasurer (Tau Beta Pi); Dean Stanley H. Pierce, vice-president (Phi Kappa Phi); Dr. George L. Webster, president (Rho Chi); Dr. Marsh W. White, past president (Sigma Pi Sigma); Mr. Donald B. Hoffman (Phi Alpha Theta); Mrs. M. Stanley Ginn (Mortar Board). Standing, left to right: Dr. Robert W. Bishop (Omicron Delta Kappa); Dean Ralph C. Bursick (Beta Gamma Sigma); Dr. Frederick S. Youkstetter (Delta Phi Alpha); Dr. Charles W. Shull (Pi Sigma Alpha); Dr. Maurice L. Moore (Alpha Epsilon Delta); Dr. Henry Van der Schalie (Phi Sigma); Dr. P. E. Lull (Tau Kappa Alpha); Dean Irma H. Gross (Omicron Nu); Dean William E. Alderman, Jr. (Phi Epsilon Sigma); Dr. J. J. Moore (Alpha Omega Alpha); Miss Peggy Iden (Chimes); Prof. Paul H. Coy (Tau Sigma Delta); Prof. Duane A. Branigan (Pi Kappa Lambda); Prof. Frank W. Stubbs, Jr. (Chi Epsilon); Prof. David S. Clark (Pi Tau Sigma). Photo by Alton B. Zerby (Eta Kappa Nu).

society" be used rather than "fraternity" or "honorary" in connection with campus organizations which elect from students of high-scholastic standing; and that "recognition society" be used rather than "fraternity" to describe campus organizations that elect with the primary requirements of extracurricular activities or interests.

The following officers were elected to

hold office until the annual meeting of 1952:

President: Dr. George L. Webster, Rho Chi (Pharmacy — men and women), College of Pharmacy, University of Illinois, Chicago, Illinois.

Vice-President: Ass't. Dean Stanley H. Pierce, Phi Kappa Phi (all academic fields—men and women),

College of Engineering, University of Illinois, Urbana, Illinois.

Secretary-Treasurer: Robert H. Nagel, secretary-treasurer of Tau Beta Pi (engineering—men), University of Tennessee, Knoxville, Tennessee.

In addition to these three, the following form the executive committee:

Ex-officio: Dr. Marsh W. White, executive secretary of Sigma Pi Sigma (physics—men and women), The Pennsylvania State College, State College, Pa.—junior past president of A.C.H.S.

At Large:

Dean Adel H. Stamp, treasurer of Alpha Lambda Delta (freshman

scholarship—women), University of Maryland, College Park, Maryland.

Mr. Donald B. Hoffman, executive secretary-treasurer of Phi Alpha Theta (history—men and women), Allentown, Pennsylvania.

The following were elected members-at-large of the Council:

Dr. A. J. Brumbaugh, President of Shimer College, Mount Carroll, Illinois.

Dr. David D. Henry, President of Wayne University, Detroit, Michigan.

Dr. C. Woody Thompson, Professor of Economics and Director of Bureau of Economic Research, State University of Iowa, Iowa City, Iowa.



Colleges Must Graduate Good Americans

Colleges do not speak as often as they used to about their responsibility for the character development of their students. Such phrases as "the development of personality" or of "the whole person" seem to have replaced the older phrase. But whatever the word, the task is the same, although perhaps more difficult. America will find leadership adequate to her needs as long as the colleges continue to graduate young men and women who can think and act responsibly.

The small college enjoys a particular advantage in the education of responsible citizens. With a strong faculty and a good library it can successfully stimulate thinking and encourage students in the search for truth. But it can do more. Its campus government, its extra-class activities, its student-faculty undertakings invite the student to assume responsibility. He learns to conduct himself democratically. He gets practice in citizenship.

The college which takes a responsible view of its function today will agree with President Eisenhower's con-

viction when he said, "What good are exceptional physicists, exceptional chemists, exceptional engineers, exceptional anything else—unless they are exceptional Americans?" The colleges will not graduate many exceptional Americans but they will graduate good Americans. They will revise the content and teaching techniques of some of their courses to point up critical current issues in our American democracy. They will seek in the classroom and on the campus to develop within the student a mature sense of responsibility; for the heavy, thankless burdens of leadership now resting upon us must be willingly accepted by the young men and women in our colleges if the values of our American democracy are to be attained more fully at home and abroad.

The college which would serve the nation and the world today must meet, with spirited determination, the challenge of its central obligation. It must seek to graduate good Americans—informed, courageous, and responsible.—C. F. Richards, "at Denison."

PHI SIGMANS IN THE NEWS



Jim Neidhoefer, affable president of Neidhoefer & Co., Milwaukee (seated at desk), may not "flounder" through a day's work at his unusual new executive office, but he's surrounded by nearly every other kind of game fish, as this picture of part of the big room shows. Marlin, tuna, sailfish and even a shark (reminiscent, no doubt, of tax collection time) adorn the walls of Fisherman Jim, trophies of his vacations in Florida. Other walls of the unique office hold heads of big game. Neidhoefer, a trained biologist, also raises tropical fish in his hours away from the wholesale floor coverings firm.

Sentinel photo.

CHARLES C. BEAZLEY, Alpha Psi:

carried on the "Army, Navy, Air Force Journal's," 30 December 1950, list of some 943 Distinguished Military Students who have been taking military science courses in addition to their regular undergraduate work at institutions other than West Point. He is among those to whom appointment as a second lieutenant in the Regular Army is thus being offered. Charles C. Beazley was Chapter Delegate for Alpha Psi, Virginia Polytechnic Insti-

tute, to the Denver meeting of Phi Sigma. Congratulations!

ROBERT FLINT CHANDLER, JR., Delta:

was selected by the Trustees of New Hampshire's State University to succeed Dr. Arthur Stanton Adams as 12th President of the University. Dr. Chandler is a native of Columbus, Ohio, grew up in Maine, took his B.A. at Maine, his Ph.D. in Horticulture at Maryland, and did postgraduate work in soils and plant nutrition in the University of California. He has held

teaching and research positions at Cornell, Texas A. and M. and worked with the Rockefeller Foundation in Mexico from 1946 to 1947. He is a member of Phi Sigma, Alpha Zeta, Phi Kappa Phi and Sigma Xi. His social fraternity is Beta Theta Pi. He is married and has two sons and a daughter.

MAURICE L. MOORE, *Sigma*:

is National Secretary of Alpha Epsilon Delta and Director of the Research and Development Laboratories of Smith, Kline and French, pharmaceutical manufacturers of Philadelphia.

JAMES R. NEIDHOEFER, *Alpha Omicron*:

By FRED HAEUSER
Business Editor

Like Mahomet, Milwaukee's James Neidhoefer is smart.

Maybe Jim Neidhoefer is even smarter, for unlike Mahomet, Neidhoefer has gotten around that business of compromising with mountains . . .

Only in Neidhoefer's case it's the seashore that is involved instead of the mountain.

And unlike Mahomet, who couldn't will the hill to come to him, the Milwaukee carpet wholesaler has done a pretty fair job in his new offices of bringing the flavor of Florida to his deskside.

Because Neidhoefer's principal recreational joys are found in the singing reel of deep water tackle or in the big game stalk through rugged Canadian timberland, the decor of his new 20 by 30 foot office incorporates the fruits of many vacation jaunts.

The visitor's first impression in passing the portal is that he has blundered into the private den of the late Frank Buck, or at least the study of an ardent taxidermist.

High-ceilinged, the room's broad walls are well suited to the wild life trophies with which they are burdened.

MOOSE LOOKS DOWN

The pendulous nose of a Canadian moose just to the right of the entry seems to leer over the visitor's shoulder and his antlers are broad enough to provide shade on a hot summer day.

Matching this trophy from the herbivorous field are the heads of two buck deer with interlocked horns, mounted just as Neidhoefer found them in the woods, dead of their rutting

season struggles for the favor of a doe.

Huge Texas steer horns and the pelt of a Canadian black bear stretched across the floor are other oddities of the room.

But the piscatorial panorama across two whole walls of the room dominates the scene, for basically, Jim Neidhoefer is a fisherman.

And because the warm Florida waters are his favorite trolling grounds, most of the stuffed specimens flicking their tails realistically across the 50 foot expanse are tropical in nature.

Centered over his modernistic desk Neidhoefer has mounted the world record Atlantic sailfish weighing 91 pounds and 12 ounces which he took off Miami Beach last April on a 15 thread line.

Across the room, posed in the act of leaping from the water, is a white marlin, the second largest of its kind Neidhoefer has bagged in the numerous years he has been fishing in Florida.

Too huge to be represented by more than its head is a 560 pound tuna snared by Neidhoefer. And dotting the wall in between the major trophies are albacore, bonita, dolphin, a porpoise head, barracuda, shark and wahoo.

Oddly enough, for all his years of fishing off Florida, Neidhoefer never has landed a tarpon, one of the commonest denizens of the Gulf Stream.

Walls of the executive office are done in maize and dove gray with the wall behind Neidhoefer's desk covered with Walltex.

FISH IN CARPETING

On the floor is Mohawk carpeting—they sell carpeting, you remember—of a hand carved chenille with a six foot sailfish imprinted on it especially for Neidhoefer.

(James R. Neidhoefer, subject of the foregoing news-bit reprinted with permission from the Sunday, Nov. 12, 1950, Milwaukee Sentinel, was Alpha Omicron's first chapter president in the group which was inducted 18 June 1938 by the Editor of the Biologist acting for the Council. Neidhoefer reported his research on the fresh-water sponge, *Carterius tenosperma* (Potts)

which he reported as new to Wisconsin waters at the 1938 AAAS meeting in Richmond, Va.)

WILLIAM H. SHIDELER, Ph.D., *Upsilon*:

"OUR FRATERNITY ANCESTORS" in the October 1950 "Banta's Greek Exchange" was a well thought out, historical plea for fraternity life as supplying that phase of ritualistic life which is lacking in the lives of so many Americans. After the historical preludes from ancient Egypt, Phoenicia, Chaldea, etc., down to Williamsburg and Phi Beta Kappa, the author tied into the anti-fraternity writers who were scareheading some of the weekly periodicals last Fall. The following paragraphs are indicative of the trend of Dr. Shideler's line of thought:

The ritual and grip of $\Phi B K$ were very simple and with modification are found quite adequate and satisfactory for use today. So far as my knowledge goes every fraternity has a ritual expressing the best hopes and aspirations of mankind. This applies even to $\Theta N E$ now fortunately defunct (we hope!) but a potent factor in college life 30 to 50 years ago.

Rituals apparently grew very gradually, and are used to express in more or less dramatic allegorical form the basic principles, ideals and aspirations of the fraternity. Commonly the candidate passes through the three degrees of knighthood, or searches for the Holy Grail, or goes upon a similar type of holy pilgrimage, or becomes a character in a dramatic reenactment of the Damon-Pythias episode, or something of the sort. Or he may, as in the ancient rites and mysteries, experience a symbolic death and resurrection, as is most dramatically done in at least one case.

Recent articles in *Collier's* refer to ritualistic presentation as "mumbo-jumbo" and "hocus-pocus." All I can say is that I have seen tears come into the eyes of initiates, which in this sophisticated and hardboiled younger generation is something certainly of powerful influence. I imagine there are others here who have made the same observation. Any person who is so inert, so proof against the impact of the accumulated noblest ideas and aspira-

tions of the ages as to call them "mumbo-jumbo" and "hocus-pocus" is certainly not a person whose ideas should be given any weight. Millions of people have found in rituals encouragement, a positive constructive philosophy of life, a potent stimulus to make the world a better place in which to live. And all this is dismissed by *Collier's* as "hocus-pocus" and mumbo-jumbo."

There are two schools of thought with respect to college fraternities. One school, and a very large one which probably includes the great majority of men outside fraternity membership, would have it that continued active interest after graduation is indicative of arrested development, chronic infantilism, perpetual sophomorphism, or something of that kind, while intensified interest in later life is merely an effort on the part of those who are over the hill and slipping down the far side to re-capture some elements of their more dynamic and optimistic youth. So, naturally, I have been intensely interested in knowing just what manner of men these may be.

This school of thought that regards postgraduate interest in college fraternities as merely a vestigial hangover from a more juvenile state was very vociferous during the past war about predicting dire things for the future of the American college fraternity system. According to their way of thinking the system was doomed for one reason or another, and was expected gradually to wither and die out in postwar days. This was clearly but a case of wishful thinking because in the first place none of their arguments were convincing, and in the second place since the war the fraternity system has expanded enormously and is still so expanding, and not only that but as previously stated is consolidating its gains and digging in solidly with every evidence of permanency.

Like any other democratic organization, fraternities are not perfect. Like any other organization made up of human beings, they are subject to the weaknesses and frailties of mankind. And, like any other constructive association of men, they are trying to im-

prove their efficiency and correct their mistakes.

It is easy to cull out everything that might possibly be discreditable, ignoring everything that might possibly be creditable and good and decent, and so get a terrified but entirely wrong evaluation of fraternities—of a faculty or of the Bible, or of almost anything else.

ABOUT DR. SHIDELER

One of the four founding fathers of $\Phi K T$, Dr. Shideler has long been a student of ritualism and rite. He was born at West Middletown, Ohio, in 1886 and as an undergraduate at Miami University helped in the establishment of $\Phi K T$'s Alpha Chapter in 1906.

Who's Who in America says: "A. B. Miami U., 1907; Ph.D. Cornell U., 1910 . . ." He has been a member of the Miami faculty since 1910, has been

professor of geology since 1920. He has served on the Ohio Geological Survey and the Kentucky Geological Survey, is a member of the Geological Society of America, The American Paleontological Society, the A.A.A.S., the Ohio and Indiana Academies of Science.

Dr. Shideler is a member of $\Phi B K$, $\Sigma \Xi$, $\Phi \Sigma$, $\Sigma \Gamma E$, $O \Delta K$, all honor societies. He is a 32° Mason, a Republican and Presbyterian.

During World War II he served as secretary - without-salary-for $\Phi K T$ while Secretary Young was absent in the Navy.

Dr. Shideler is chairman of the expansion committee of the Mid America Athletic Conference and keeps a youthful enthusiasm for sports of all kinds. —Banta's Greek Exchange, Oct., 1950, pp. 305-314.



Leaders of Labor Study at Harvard

With the addition of nine new Trade Union students in the autumn, the number of labor officials who have participated in the Harvard Trade Union program since its beginning in 1942 has now passed the hundred mark. The thirteen-week program, under the auspices of the Department of Economics and the Graduate School of Business Administration, is said to be "the only course in the United States offering intensified study for leadership responsibility in unions."

Customarily, the course is given only once a year, but because top officials could not be spared, due to the current pressure of political campaigns, con-

ventions, and the demands of the Korean crisis, the unions have requested an extra session which will probably take place in the spring. The autumn's crop of labor students, representing seven different organizations, are studying pension programs, accounting, and labor laws alongside the business executives attending the Advanced Management program. One of the events of the season is a special conference on problems in the railroad industry; another a mock arbitration hearing at which union leaders and management spokesmen will argue a wage issue before a mediator of their own choosing.—*Harvard Alumni Bulletin*.



The place of American higher education in this mounting crisis will be what it was in World War II—a strong source of morale. For loyalty is more than an instinct. It is likewise the product of informed understanding of the issues at stake. Colleges and universities the country over will be called on for training—the general training of top-grade young people capable of

use in a hundred directions; and the specialized training of selected students for special duty in the armed forces.

The larger universities like ours again will become the arsenals of special research—basic and fundamental, such as the further development of atomic energy.—President J. L. Morrill, The University of Minnesota.

THE 1950 GENERAL MEETING

When it was announced last Fall that this year's general meeting would be sponsored by two Chapters there was some skepticism as to the outcome. The Council went out on a limb on the deal and everyone wondered how it would all come out.

Whether for that reason, or because the memory of New Mexico's famous meeting still had its effect, or maybe because the Chapters thought it the right thing to do, there was an almost 100% attendance of Chapter Delegates at the sessions. They were a representative unit,—and here an editorializing guest might have gone into a tizzy about the girls from the deep South, or the Middle West, or the Eastern Seaboard, or the Far West,—and likewise about the gentlemen from all the sections of our country. Quickly catching the spirit of informality which the Council Officers injected into their very first pre-session introductions, the first evening meeting was hardly over before people were calling one another by their first names as if they all belonged to but one campus chapter.

BETA—Univ. of Mich., Ann Arbor, Mich., Dana P. Snyder.

EPSILON—Univ. of Denver, Denver, Colo., Benjamin B. LeMaster.

ZETA—Univ. of Wisc., Madison, Wisconsin, Samuel C. Wiggans.

ETA—Univ. of Akron, Akron, Ohio, *.

KAPPA—Univ. of Kansas, Lawrence, Kansas, Ivan Shields.

LAMBDA—Mont. State Univ., Missoula, Mont., Klas K. Fenell.

NU—Wash. & Jeff. College, Washington, Pa., *.

PI—Emory University, Georgia, *.

RHO—Univ. of Illinois, Urbana, Illinois, Wm. C. Dolowy.

SIGMA—Univ. of Fla., Gainesville, Fla., Charles W. James.

UPSILON—Miami Univ., Oxford, Ohio, Irene Beschmer.

PHI—Univ. of N. H., Durham, New Hampshire, Beulah Young.

CHI—Mont. State College, Bozeman, Mont., Richard H. Smith.

PSI—Univ. of Wash., Seattle, Washington, Gertrude Horn.

OMEGA—Univ. of Okla., Norman, Oklahoma, Robert Coalson.

ALPHA ALPHA—Univ. of S. Calif., Los Angeles, Frances L. Cramer.

ALPHA BETA—Mt. Union College, Alliance, O., *.

ALPHA EPSILON—Univ. of Pittsburgh, Pa., Richard T. Hartman.

ALPHA ETA—Okla. A. & M., Stillwater, Okla., Richard Orr.

ALPHA IOTA—Bucknell Univ., Lewisburg, Pa., Paul M. Hurst, Jr.

ALPHA KAPPA—Hunter College, N. Y. C., Gertrude Ritter.

ALPHA LAMBDA—Univ. of Utah, Salt Lake City, Burke K. Judd.

ALPHA MU—Univ. & State College of Ore., Corvallis, Oregon, D. C. Torgeson.

ALPHA NU—Univ. of N. Mex., Albuquerque, N. M., Jos. W. McKinley, Jr.

ALPHA XI—R. I. State College, Kingston, R. I., Thomas Fanning.

ALPHA OMICRON—Marquette Univ., Milwaukee, Wis., Howard K. Suzuki.

ALPHA PI—Univ. of Colo., Boulder, Colorado, Harold Grant.

ALPHA RHO—Univ. of Ark., Fayetteville, Ark., Lloyd O. Warren.

ALPHA SIGMA—Univ. of Texas, Austin, Texas, George Ann Smith.

ALPHA UPSILON—U. C. L. A., Los Angeles, Calif., Sally J. Ball.

ALPHA PHI—Coll. of Puget Sound, Tacoma, Wash., Tim Chapman.

ALPHA CHI—Univ. of the Philippines, Lucia Manikis.

ALPHA PSI—Va. Polytech. Inst., Blacksburg, Va., Charles C. Beazley.

* Chapter unable to send a delegate this year.

Through the kindness of the Lambda Chi Alpha Chapter on the University of Denver campus, almost all our sessions and meals were taken within their hospitable walls and around their plentiful table.

The first session got under way shortly after the first evening meal on Wednesday. Its actions will be recounted in detail in other pages of this issue. By the time each Chapter

Delegate had introduced her- or himself and his or her Chapter's activities, everyone felt very much at home, and the process of getting the committee sessions under way the same evening went on without a hitch. In fact several committees dispatched their functions with so much ease that they were able to sit in on the sessions of other groups.

Breakfast was early Wednesday morning at the Lambda Chi House, but

before most of the delegates were through eating there was a huge University of Colorado bus parked outside.

The trip along the foothills up to Boulder went by so rapidly that the delegates were there almost before they knew it. Perhaps the singing had something to do with it: "Doc" Lagler and "Tiny" Shields had something to do with the singing, although almost everyone, including the Padre,



Top row, left to right: Dr. Gordon Alexander, Alpha Pi; Gertrude Ritter, Alpha Kappa; W. C. Doloway, Rho; Ivan Shields, Kappa; Tim Chapman, Alpha Phi; R. T. Hartman, Alpha Epsilon; L. O. Warren, Alpha Rho; Robert Coalson, Omega; S. C. Wiggins, Zeta; P. M. Hurst, Alpha Iota; Harold Grant, Alpha Pi; D. P. Snyder, Beta; C. C. Beazley, Alpha Psi; K. K. Fennell, Lambda. Third row: H. K. Suzuki, Alpha Omicron; Irene Beschmermer, Upsilon; Beulah Young, Phi; B. H. Judd, Alpha Lambda; D. C. Torgeson, Alpha Mu; Richard Orr, Alpha Eta; R. H. Smith, Chi; C. W. James, Sigma; Dixon, Mesa, Col. Bottom row: S. J. Ball, Alpha Upsilon; G. A. Smith, Alpha Sigma; Gertrude Horn, Psi; Lucia Manikis, Alpha Chi; A. I. Ortenburger, Ervina Stewart, Henry van der Schalie, A. M. Feele, F. L. Cramer, Alpha Alpha; T. F. Fanning, Alpha Xi.

joined in when they knew the words, —the air didn't matter, to much. Spectacular was the word for the performance of "Gentil Allouette" under the inspired leadership of Marquette's Howard Suzuki.

The main business section was held in one of the classrooms of the University of Colorado's beautiful Museum Building. As soon as it was over a group picture was taken and the session adjourned by twos and threes to one of Boulder's larger eating places where luncheon was served in a private dining room large enough to accommodate all the delegates, officers and the Epsilon and Alpha Pi members who were in attendance.

Immediately after the return to the Museum, the party broke up into groups and boarded a fleet of University of Colorado station wagons, most of them faculty-driven. The entire afternoon was spent on tour through the lower eastern mountains terminating at what was left of one of the "ghost Towns" of the ancient gold-mining days. Dr. Gordon Alexander of the University of Colorado was along as guide and official answerer of questions biological or otherwise. The snowline hadn't gotten down to our destination but it was on its way, and the heavy fall which the higher peaks were receiving effectively prevented our getting any worthwhile pictures. The return trip to Boulder was made by an entirely different route, giving all the delegates a chance to see not only a lot of abandoned gold mines as well as some still operating, but also the characteristic vegetation on the different slopes.

The General Meeting Banquet was held Thursday night after the return from Boulder. There was a lot of singing, and a general atmosphere of enthusiasm and cordiality. Following the banquet the group adjourned to the lounge where Dr. Gordon Alexander gave a most interesting illustrated lecture, the text of which he has obligingly recreated for this issue of *The Biologist*. Among those present were the Faculty Advisers of the two chapters, and Mr. Milligan, the printer of the *Biologist*.

The closing session was held Friday morning, and most of the debatable matters which had been left over from the previous session were dispatched so rapidly that the adjournment sine die was effected in plenty of time for lunch. The afternoon was devoted to such sightseeing or visiting as the delegates wished to do before starting for home with very pleasant memories of a most profitable and enjoyable general meeting of the society.

ALPHABETICAL LIST OF OFFICIAL DELEGATES AND OFFICERS PRESENT

- Sally J. Ball, ALPHA UPSILON,
University of California at Los Angeles, Calif.
- Charles C. Beazley, ALPHA PSI, Virginia Polytechnic Institute, Blacksburg, Va.
- Irene Beschmermer, UPSILON, Miami University, Oxford, Ohio.
- Tim Chapman, ALPHA PHI, College of Puget Sound, Tacoma, Wash.
- Robert Coalson, OMEGA, University of Oklahoma, Norman, Okla.
- Frances L. Cramer, ALPHA ALPHA, University of Southern California, Los Angeles, Calif.
- William C. Dolowy, RHO, University of Illinois, Urbana, Ill.
- Thomas F. Fanning, ALPHA XI, Rhode Island State College, Kingston, R. I.
- Klas K. Fenell, LAMBDA, Montana State University, Missoula, Mont.
- Harold Grant, ALPHA PI, University of Colorado, Boulder, Colo.
- Richard T. Hartman, ALPHA EPSILON, University of Pittsburgh, Pittsburgh, Pa.
- Gertrude Horn, PSI, University of Washington, Seattle, Wash.
- Paul M. Hurst, Jr., ALPHA IOTA, Bucknell University, Lewisburg, Pa.
- Charles W. James, SIGMA, University of Florida, Gainesville, Fla.
- Burke H. Judd, ALPHA LAMBDA, University of Utah, Salt Lake City, Utah.
- Dr. A. M. Keefe, Editor, St. Norbert College, West DePere, Wis.
- Dr. Karl F. Lagler, Vice-Chancellor, Department of Zoology, University of Michigan, Ann Arbor, Mich.
- Benjamin B. Le Master, EPSILON, University of Denver, Denver, Colo.

- Joseph W. McKinley, Jr., ALPHA NU, University of New Mexico, Albuquerque, New Mex.
- Lucia Manikis, ALPHA CHI, University of the Philippines, Manila, P. I.
- Richard Orr, ALPHA ETA, Oklahoma A. & M., Stillwater, Okla.
- Dr. A. I. Ortenburger, Chancellor, Department of Zoology, University of Oklahoma, Norman, Okla.
- Gertrude Ritter, ALPHA KAPPA, Hunter College, New York City, N. Y.
- Ivan Shields, KAPPA, University of Kansas, Lawrence, Kan.
- George Ann Smith, ALPHA SIGMA, University of Texas, Austin, Texas.
- Richard H. Smith, CHI, Montana State College, Bozeman, Mont.
- Dana P. Snyder, BETA, University of Michigan, Ann Arbor, Mich.
- Erwine H. Stewart, Treasurer, Mesa, Col.
- Howard K. Suzuki, ALPHA OMICRON, Marquette University, Milwaukee, Wis.
- D. C. Torgeson, ALPHA MU, University and State College of Oregon, Corvallis, Ore.
- Dr. Henry van der Schalie, Secretary, Museum of Zoology, Ann Arbor, Mich.
- Lloyd O. Warren, ALPHA RHO, University of Arkansas, Fayetteville, Ark.
- Samuel C. Wiggans, ZETA, University of Wisconsin, Madison, Wis.
- Beulah Young, PHI, University of New Hampshire, Durham, N. H.



Preparedness Is Needed

This is a time for preparedness—mental and physical preparedness—on the campus as well as in the camps. We of the University community owe it to ourselves and to our country to be alert to every development—to keep abreast of the inescapable obligations, responsibilities, dangers, and opportunities which world events have brought to us as a group and as individuals. A university campus is not a shelter; it is an outpost.

Those students who are not presently called will fulfill their duty through hard and intelligent work here on the campus.

Nothing could be more disconcerting

to the national welfare at this time than for our colleges and universities to be diverted from their mission of broad and deep learning, research, and public service. Our state and country need, and will continue to need, in peace or war, well-educated young men and women in many types of activity. Even as we move into troubled waters, our task is always to steer truly toward a basic purpose of the education of free men—the cultivation of those skills, understandings, sentiments, and ideals which will eventually bring peace and plenty to all mankind. —President E. B. Fred, University of Wisconsin.

MINUTES OF THE 1950 GENERAL MEETINGS

December 27, Wednesday, 7:30 P. M.
Organization Meeting in the Lambda Chi Alpha House, University of Denver, Colorado.

Attended by: Members of the Council (with the exception of the President, Dr. Goldschmidt), 25 delegates and 1 alternate delegate.

Dinner was served at 5:30 p. m. in the Lambda Chi Alpha house. After dinner, Dr. Lagler showed some khodachrome pictures taken at the previous general meeting in Albuquerque, New Mexico.

Chancellor Ortenburger called the meeting to order promptly at 7:30 p. m. In his expression of welcome he stated that he wished especially to thank the authorities of the University of Denver, as well as the members of the Lambda Chi Alpha fraternity for making such excellent facilities available to our Society.

Following the introduction of the members of the Council, committee appointments were made. The Chancellor stated that he wanted it clearly understood that the *Council* is only an *advisory group* which serves the Society between general meetings. Although a Council member will be available to help inform each committee, it is up to the committee to arrive at decisions independently. Committee decisions are later referred to the whole group for action.

Committees appointed:

I. Auditing: Young (Phi) (Chairman), Ball (A. Upsilon), Horn (Psi), meeting with Stewart.

II. Nominating: Shields (Kappa) (Chairman), Cramer (A. Alpha), Beazley (A. Psi), meeting with van der Schalie.

III. *Biologist*: Fanning (A. Xi) (Chairman), Hurst (A. Iota), Manikis (A. Chi), meeting with Keefe.

IV. Constitutional Amendments: Coalson (Omega) (Chairman), Snyder (Beta), Berschermer (Upsilon), meeting with Stewart.

V. Resolutions: Orr (A. Eta) (Chairman), Ritter (A. Kappa), Suzuki (A.

Omicron), meeting with Lagler.

The Chair then called for a *brief report from each chapter delegate*. As an aid to chapters interested in program suggestions the following resume is given:

Beta: Meet monthly and usually have an outside speaker. Want more group activity. Also find an annual photographic exhibit of considerable interest.

Epsilon: With only six members returning, this chapter found it difficult to work this year. Some 23 new members were added recently. Meetings are bimonthly and usually there are 2 or 3 speakers from among the chapter members.

Zeta: (Weather conditions prevented delegate from attending the first day.)

Eta: (Chapter unable to send delegate this year.)

Kappa: Meet bimonthly, alternating a noon with an evening meeting. Chapter members talk at the noon meetings; evenings reserved for outside speakers. Printing of programs well in advance of the meetings has proven to be helpful in securing a reasonable attendance.

Lambda: Use both graduate students and outside speakers in programs. Group has several foresters who have made some excellent moving pictures available.

Nu: *Pi*: (Chapters unable to send delegates this year.)

Rho: Meetings are held monthly with either a speaker or a panel discussion provided. In order to secure a proper attendance, attractive posters (shown to delegates) are sent out to each member and are also placed on all bulletin boards on campus.

Sigma: Monthly meetings with lectures by faculty or visitors. The variety of fields represented in this chapter is unusually large.

Upsilon: There are only about 30 members. Speakers and movies are mainly used at meetings. Activities center largely in Botany and Zoology.

Phi: There has been an increase in activity. Meetings are bimonthly and speakers represent both the faculty and other schools. By working together with Sigma Xi, money has been made available for outstanding lectures. Social meetings are held in the form of trips to the White Mountains.

Chi: At present, this chapter is very active. Speakers are both departmental and from outside. Meetings bimonthly with some in the form of luncheons. Coke machine and candy sales concessions prove a considerable aid in getting funds for special activities. Programs designed to help create interest in biology in high schools throughout the state.

Psi: Meetings are monthly and guest speakers are invited from fields other than biology. Interests are wide and varied. Difficulty exists in getting attendance from fields other than that which appears on agenda.

Omega: The bimonthly meetings are arranged so that speakers alternate with business meetings. Chapter is quite active this year.

A. Alpha: Chapter is fortunate in being able to use the facilities of the Hancock Foundation for holding its meetings. Meet monthly with outside speakers. Program published. Chapter news letters help to keep members informed.

A. Beta: (Chapter unable to send a delegate this year.)

A. Epsilon: (Delegate late because of difficulty in travel.)

A. Eta: Chapter experienced some difficulty in starting this year. Meetings are bimonthly and speakers are largely faculty members.

A. Iota: Only six active members with six initiates. Programs are arranged so that members report on their research projects. Meetings are held monthly and every effort is made to maintain a high standard for initiation.

A. Kappa: The group research reports formerly used are now replaced by outside speakers. Chapter has about 50 members and 16 new initiates.

A. Lambda: A good start made in this chapter this year. Speakers are both departmental and outside the institution. The public is invited to the meetings. Response has been good.

News letter is also used within the chapter.

A. Mu: Speakers are used and the public is invited to open meetings. Because initiation was in the spring many members were lost to the chapter. Initiation will be held in the winter quarter. A wide variety of fields represented in this chapter.

A. Nu: Initiation held twice a year. Speakers are among a wide variety of fields, including such interests as Geology. An attempt is made to get the graduates to contribute to the meetings and discussion is encouraged.

A. Xi: Open meetings held with outside speakers. In the past the college has been considerate in offering an honorarium for outside speakers.

A. Omicron: Monthly meetings with speakers from neighboring schools, such as Univ. of Chicago, Northwestern, etc. Newsletters are circulated. An interest expressed in reactivation in other schools.

A. Pi: Speakers are taken from Biology as well as other departments. Meetings are open and reports from faculty members returning from trips abroad have been of special interest.

A. Rho: Speakers from chapter as well as faculty. Reports on research projects closed to public—other meetings are open.

A. Upsilon: Meetings monthly and speakers vary from formal talks to reports by members of the Park Service. Field trips are considered among the most interesting activities.

A. Phi: Monthly meetings with outside speakers. Field trips are held during the school year. Two outstanding sophomore students are taken into the chapter each year. Talks cover widely related fields.

A. Chi: Only seniors admitted in the undergraduate group. Many outside speakers represent workers from scattered regions and the subjects covered are in widely related fields.

A. Psi: Meetings are held bimonthly with speakers from all departments in the school. Picnics are held in the spring. Animal and dairy husbandry are included in membership. To stimulate interest among the undergraduates a reward of \$25 is given for the best research project.

The delegates were pleased to welcome a representative from XI chapter. The Society is hoping that the group at the University of Nebraska will return to active status.

The Chair recommended that the committees start work immediately. Prior to the conclusion of the formal meeting, the Treasurer stated that he would be pleased to straighten any errors that may have been made inadvertently in the railroad fares provided the delegates.

* * *

Thursday Morning, December 28. 9 A. M. *Minutes* of meeting at the Museum, University of Colorado, Boulder.

Report by Executive Secretary:

The general letter of information that goes to the chapters at the beginning of the school year *should be consulted with care* by all of the officers. If we could have the name of a "Council Representative" (permanent faculty member to whom Phi Sigma Council mail may be sent when names and addresses of new chapter officers are not available) for each chapter, several serious delays would be avoided at the beginning of each school year when we try to get information to the local chapters.

In the 1948-49 school year, 1,186 members were initiated, and during the past year (1949-50), 1,110 members were added, bringing the total membership in the Society to 17,677.

Two new chapters were added since the last (1948) General Meeting: *Alpha Chi* at the University of the Philippines, and *Alpha Psi* at Virginia Polytechnic Institute. The chapter at Fordham University was approved by both the Council and the necessary two-thirds of the active chapters but because of the loss of the sponsor at that school installation has not been possible.

It is with considerable satisfaction that the Council reports acceptance of our Society into the Association of College Honor Societies. We urge that all chapters make a serious effort to maintain high standards for membership.

Award certificates were substituted for the medallion. These awards are given to one graduate and one under-

graduate at each of the schools that maintains an active chapter. The administrative officers of all schools have been very pleased with this means for encouraging research and scholarship.

In keeping with a recommendation at the last General Meeting a statement of the financial status of the Society was sent to all of the chapters.

Report of the Treasurer:

Because of the expenditures that come with a General Meeting it is difficult to give an accurate statement until after the early part of January. In general, the following statement seems reasonably close:

General Fund—a deficit due to demands for meeting

<i>Biologist Fund</i> —in excess of	\$9,000
Meeting Fund	2,200
Endowment Fund	3,051

The Treasurer urged that the chapters make a more serious effort to return the cards that are sent out from the Secretary's office for ordering the number of copies of the *Biologist* needed by each chapter.

1. Report of Auditing Committee.

The Auditing Committee then reported that the Treasurer's books were examined and were in good condition. Statement of C.P.A. showed books to be in order.

A. Omicron moved acceptance of report. Omega seconded. Accepted unanimously.

II. Report of the *Nominating Committee*. The Chair asked that Dr. Keefe take over the meeting for this report.

The committee chairman stated that:

(1) the Chancellor wished to resign.

(2) the committee recommended that the Vice-Chancellor succeed him.

(3) the Treasurer (after 33 years of service) be made Vice-Chancellor.

(4) Mrs. Tema Clare be proposed for Treasurer.

The Chair called for nominations from the floor for Chancellor.

A. Alpha moved acceptance of the recommendation. Seconded by A. Rho. Carried unanimously.

The Chair then called for further nominations for Vice-Chancellor.

Lambda moved nominations be closed. Seconded by A. Mu. Carried unanimously.

The Chair then asked for further nominations for Treasurer.

Chi moved that the Secretary cast a unanimous ballot for the candidate recommended by the Committee. A. Phi and Beta seconded. Motion carried.

The new Chancellor, Dr. Lagler, returned to the meeting and took the Chair.

III. Report of the *Biologist* Committee:

Committee considered matter of having the *Biologist* sent to members on an individual mailing list. Abandoned idea for two reasons: (1) financially impossible, and (2) too difficult to keep track of student addresses. Seems best to let the Chapter Secretary distribute the issues.

Committee urged the procurement of suitable material both in quality and quantity. Material must appear in proper form and should be submitted by mid-September to be ready for a spring issue. Popular and humorous material are especially welcome. The Editor pointed out that he will try to get issues out in Sept., Nov., Feb. and April. It takes a month to see an issue through the press.

Thesis material is not usually suitable for the *Biologist*. Better to use material with general and broader interest. Reprints are available from printer at a reasonable cost.

Chair called for motion on report.

A. Pi moved acceptance. A. Eta seconded. Carried unanimously.

Discussion: Kappa commended the trend towards general information. The Chair suggested printing items dealing with the development of research projects. Editor suggested matters dealing with audio-visual aids and information about summer biological stations would be furnished.

IV. Report by *Constitutional Amendments Committee*:

1. Beta suggested that the Chapter Editor should be a member of the executive committee of chapter council, calling for a change in Art. 2 of Sec. VI where "an Editor" be inserted. A similar change would then appear in Sec. 7 of Art. V where "to serve faithfully as a member of the executive committee" would be inserted.

2. Beta also wished to recommend a change in Section 1(a) of the By-

Laws. It was the feeling of that chapter that the initiates should not be made to carry all of the expenses and that the regular members should contribute to the National organization in such a way as to make the initiation fees less than they now are. Two ways in which this suggestion could be met:

(1) a refund could be made to the initiates by the chapter itself, or (2) the National dues could be lowered.

3. Beta further suggested that notices be sent out in advance to all chapters informing them of any re-elections that are to take place in the Council.

Discussion: A. Omicron said that 2 members are elected to the Council every 4 years. Chapter itself can get this information. Beta wanted to encourage a set limit of terms (in 4 year units, if necessary) to provide proper turnover in the Council.

Omega moved that report of committee be accepted. A. Kappa so moved. Seconded by A. Nu. A. Iota inquired whether we were accepting the amendments. The Chair said they would be discussed at this meeting, and considered for acceptance at the next meeting.

Call for Question: All in favor. A. Upsilon recorded as negative.

Discussion: Dealt with chapter editor proposal and matter considered by A. Pi, A. Omicron and Beta. Further consideration held over.

V. Report by *Resolutions Committee*:

Vice-Chancellor Lagler in chair. The following resolutions were offered for consideration:

1. Whereas the University of Denver and the University of Colorado have extended to Phi Sigma their hospitality and campus facilities, be it therefore resolved that a letter of appreciation be sent to Chancellor A. Jacobs and Pres. Robert Stearns of the respective universities.

2. Whereas the Epsilon Chapter of the University of Denver and Alpha Pi Chapter at the University of Colorado have expended great effort to make the National Meeting a success, be it therefore resolved that a letter of appreciation be sent to each of these chapters of Phi Sigma.

3. Whereas the Lambda Chi Alpha Fraternity at the University of Denver has for the third time extended the use of its house for the National Convention be it therefore resolved that a scroll bearing the Phi Sigma seal be presented to the Fraternity on the behalf of the Society as a token of its appreciation.

4. Whereas Dr. Richard B. Goldschmidt has served as Honorary President of the Phi Sigma Society for 5 years be it therefore resolved that a letter be sent to him expressing Phi Sigma's appreciation for his services.

5. Whereas Dr. A. I. Ortenburger has given so generously of his time as an officer on the Council (Secretary and Chancellor) for over three decades and whereas he has found it necessary to resign from the Chancellorship, be it therefore resolved that a letter of deep appreciation be sent him in the name of the Phi Sigma Society.

6. Whereas Dr. Karl F. Lagler has served as Vice-Chancellor for four years and whereas he has resigned from his position, be it therefore resolved that a letter of appreciation be sent to him for his untiring services to the society.

7. Whereas Mr. Erwine H. Stewart has served on the Council as Treasurer of the Phi Sigma Society for 33 years and whereas he has been elected as Vice-Chancellor, be it therefore resolved that a letter expressing our appreciation for his invaluable services as Treasurer be sent to him.

8. Whereas Rho Chapter pointed out that it would be advantageous to Phi Sigma to hold its General Meeting in conjunction with the National Convention of the AAAS (or the AIBS) be it therefore resolved that the council carefully consider this suggestion if the matter be expeditious.

* * *

Friday, December 29. 9 A. M. Minutes of meeting at Lambda Chi Alpha, Denver. Lagler in Chair.

Meeting was opened with a discussion of the difficulties experienced in the Philippines due to devastation of the last war. It was recommended that each chapter make an effort to collect books to be sent to A. Upsilon for transportation to the Philippines.

Chair reopened discussion on proposal by Beta recommending that Chapter Editor be made a member of the Chapter Executive Committee (see minutes for Thursday morning above).

Discussion: A. Omicron suggested that the editor in chapter could function in somewhat the same way the *Biologist* Editor does in the Council.

Kappa stated he was not aware of lack of participation on the part of editor in the affairs of a chapter. Recommended avoiding additional change and printing expense.

Keefe: Felt editor should be well integrated in order to make function of that office more effective.

A. Iota: Called for question.

Lambda: Suggested there was no need for amending Constitution and stated that editor's work could be integrated without giving office executive power in the chapter.

Chi: Indicated that there were simply various interpretations and action could depend on local emphasis.

Beta: Re-emphasized that there were two reasons for amendment: (1) editor could be better informed as a council member, and (2) that status would give an editor more interest in his work.

A. Phi: Regardless of vote, the chapters could decide for themselves so that the chapter editor could function on a local basis.

Questions: Vote taken on motion and motion lost: 14 yes—12 no.

Omega introduced an amendment to Article II, Section 1. Change recommended is the addition of "Retiring Chancellor" to the list of the Council members.

Discussion:

Lambda: Inquired whether new officer would have a vote?

A. Upsilon: Asked if retiring officer still wished to serve.

Keefe: Pointed out that many organizations retain such important officers to lend experience to organization.

Ortenburger: Stated that it was beneficial to our organization to have a change of officers after a few terms.

Kappa: Discussed the possibilities of the terms.

Chair: Stated that terms are in multiples of four years.

A. Phi: Called for question and moved acceptance.

Beta: Seconded motion.

Motion carried unanimously.

Motion: That chapter executive committees be charged with the duty of formulating mimeographed forms with the details of the function of each officer and these recorded duties should be passed on to succeeding officers.

Discussion: A. Omicron, Kappa, A. Lambda and A. Alpha suggested materials be left with Council Representative to transmit to new officers.

Motion moved by A. Omicron, seconded by A. Lambda. *Carried* unanimously.

Motion: Beta moved that the initiation fees be reduced. Phi seconded.

Discussion: Keefe pointed out that that arrangement along with an assessment for each active member was tried formerly but it proved impractical because it cut down on the number of active members at each chapter.

Upsilon: Stated the motion was impractical.

A. Rho: Indicated that the initiation fee was not a problem at his chapter.

Chair: Suggested that the delegates sound out their chapter members so that the question could be reopened at the next General Meeting.

Beta: Interested in reaction to proposal to limit the number of terms for members of the Council. Suitable number of terms could be 4 or 12 years.

A. Phi: Seconded proposal.

Lambda: Asked how useful such action would be.

Kappa: Suggested that results of inquiry into this question could be reported at the next General Meeting.

Question: Unanimous vote to table motion till next General Meeting.

Zeta wanted to go on record for inviting the Society to Madison, Wisconsin, for the next General Meeting. A Omicron suggested that the Milwaukee group would like to join forces with Zeta to arrange a joint meeting just as this one was.

Since there was no old business and no new business, Sigma moved to adjourn.

Seconded by A. Omicron.

Meeting adjourned at 11:45 a. m.



The Heavy Drain on Enrollments

In estimating the probable impact of the military situation upon the student body after June, 1951, the most significant consideration is the announced intention of the Government to build as fast as possible an armed force of at least three million men. It is not to be anticipated that the progress of events in Korea will modify this program, although there will be popular pressures in that direction. It is my personal opinion that the nation should proceed to achieve this program as rapidly as possible as a necessary element of our combined economic, political, military and moral strength.

Since men now over twenty-three either saw service in World War II or were at that time deferred for physical or other reasons, it is likely that a greater part of the enlisted personnel, required to bring our armed forces to

3,000,000, will come from the age group of eighteen to twenty-three inclusive. This will constitute a heavy drain on the college enrollments of the country, as a brief review of relevant facts will reveal. The male population in these ages is smaller now than in 1940 and will continue to decline until 1956. When allowance is made for disqualifications of other than college students because of physical and educational handicaps and for deferment for occupational reasons such as agriculture, maritime, and other essential employments, it is apparent that the call on college students will be relatively heavy. It is probable that in June, 1951, a large number of inductions of college students will have accumulated and will take effect with the close of the college year.—President Harold W. Dodds, Princeton University.

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ogy Dept., Univ. of Kansas.

Dr. Willard Hoehn of the Midwest
Research Institute of Kansas City, Mo.,
will be guest speaker at the Phi Sig-
ma, honorary biological society, initia-
tion at 8 p. m. today in 417 Snow hall.

Dr. Willard Hoehn received his Ph.D.
degree in 1936 from Iowa State college
and served as a research chemist for
the Mayo clinic from 1936 to 1939.

He is also an associate professor
of pharmaceutical chemistry at Kansas
City university. His field of study has
been on hormones, sterols, and bile
acids.

The lecture will be followed by an
initiation of new members.

**SPEAKER DESCRIBES DOG'S
BLOOD CELLS**

10 Jan. 1950.—Differences in the number of cells in either the periphery or heart blood of the dog, a controversial point in anatomy circles, do not exist, Thomas V. Batty, Assistant Instructor of Anatomy, told 40 members of Phi Sigma, biology society in Snow hall Tuesday.

The society listened to the reading of a paper, prepared by Mr. Batty and Daniel L. Azarnoff, graduate student, which contained the results of experiments by the two on the subject.

The paper concluded: "A method is reported for obtaining blood from blood vessels using silicon-coated needles. Using this method, no significant differences could be demonstrated in the number of circulating cells of dogs in either periphery, venous or heart blood."

The experiments, the results of which have been accepted for publication by Science magazine, were done in accordance with a contract between the Office of the Surgeon General, U.S. Army and the University of Kansas.

The Daily Kansan.

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I am enclosing a copy of the program of the Rho Chapter for this year, and a copy of the poster announcing our research award on about seventy bulletin boards on this campus.

Our improved publicity is paying off in good size attendance to our meetings. An audience of ninety five persons listened to Dr. N. D. Levine's lecture.

We hope that our announcement of a research award will stimulate several candidates. I wrote our three local newspapers and asked them to publish a brief but adequate announcement of that award. A copy of the enclosed poster was attached to these letters.

M. H. Bert

Chapter Editor

Publicity Committee Chairman

Rho Chapter of
PHI SIGMA
Honorary Biological Society
announces a
PROGRAM
for
1950 - 1951

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OBJECT OF THE SOCIETY

"To Promote Research Interest In the Biological Sciences"

All meetings will be held in 223 Gregory Hall (except the banquet).

All meetings will be held on *THE SECOND WEDNESDAY OF THE MONTH*.

All meetings will be called at 7:30 P.M.

(The only exception to the second Wednesday rule is for the final meeting of the year at which new officers are to be installed.)

DATE

Oct. 11, 1950	<i>Speaker:</i> Prof. N. D. Levine, (Vet. Parasitology). <i>Topic:</i> CHEMOTHERAPY OF PARASITIC DISEASES.
Nov. 8, 1950	<i>Speaker:</i> Prof. G. S. Fraenkel, (Insect Physiology). <i>Topic:</i> THREE MONTH'S WORK WITH THE ORIENTAL FRUITFLY PROJECT IN HAWAII.
Dec. 13, 1950	<i>Speaker:</i> Panel Discussion (several departments). <i>Topic:</i> BIOLOGICAL WARFARE
Jan. 10, 1951	<i>Speaker:</i> Various members of Phi Sigma. <i>Topic:</i> Individual Research Reports
Feb. 14, 1951	<i>Speaker:</i> Prof. L. O'Kelly, (Psychology). <i>Topic:</i> THE PSYCHOLOGY OF THIRST MOTIVATION.
Mar. 14, 1951	<i>Speaker:</i> Prof. C. S. Vestling, (Biochemistry). <i>Topic:</i> (tentative) RECENT RESEARCHES ON THE LIVER. <i>Special business:</i> Election of new members.
Apr. 11, 1951	<i>Speaker:</i> Prof. R. R. Kudo, (Protozoology). <i>Topic:</i> (tentative) FROM THE AMOEBA TO MAN. <i>Special business:</i> Election of officers.
May 9, 1951	THE ANNUAL BANQUET. (YMCA Bldg.) <i>Speaker:</i> Prof. H. J. Fuller, (Botany). <i>Topic:</i> (tentative) Colored movies and lecture on The British Isles.
May 23, 1951	<i>Special business:</i> Initiation; Phi Sigma Award. Annual business meeting. (No speaker) <i>Special business:</i> Annual reports of committees and officers; installation of new officers.

BIOLOGY STUDENTS PHI SIGMA RESEARCH AWARD

Each year the National Council of Phi Sigma, Biological Honorary Society, makes an award to one student on each campus at which the Society has a chapter who presents the best report OR thesis on original research in a biological subject.

Some pertinent data are as follows:

1. The student must be enrolled in one of the following departments: Agronomy, Animal Science, Bacteriology, Botany, Chemistry (Biochemistry), Dairy Science, Entomology, Home Economics (Foods and Nutrition), Horticulture, Physiology, Plant Pathology, Psychology, Sociology and Anthropology (Anthropology), Veterinary Pathology and Hygiene, Zoology.
2. Ph.D. theses are not eligible.
3. Candidates for the award need not be members of Phi Sigma.
4. The recipient of the award need not be present on the campus to receive the award.
5. The research may be done by either a graduate or undergraduate.
6. Each of the above listed departments is asked to submit the name and report or thesis of one of their students.
7. For this year's award, the report or thesis must have been submitted between February 1, 1950 and February 1, 1951.
8. The deadline for the submission of candidate's names and reports by the departments is March 12, 1951.
9. The award will consist of the presentation of a certificate of merit by the National Council of Phi Sigma and the conferring of a sum of about \$25.00 by the local chapter. The award is made at the annual banquet of the Society held each spring at which the awardee is the Society's guest.
10. Further details may be learned from Biology faculty members on the staffs of the departments listed above.

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Phi chapter formally initiated 46
new members on Dec. 13. We really
have a thriving young crop of biolo-
gists here in Durham, and from the
looks of the "future plans" on our busi-
ness schedule, they'll all come in
mighty handy.

At one of the first meetings which the new members attended, Prof. Clark Stevens, head of our forestry dept., showed colored slides of the Mt. Passaconaway area where UNH owns some land and buildings. There was no peace among the members until a trip there was scheduled. So one weekend early in February some of our group took to the woods. Prof. served as teacher of wood lore and of the fine art of snow-shoeing. Despite the weather, the kids apparently didn't have their outing enthusiasm frozen out of them, for they came back eager to put more Passaconaway weekends into our future plans. Another trip we're looking forward to this spring is to the Wood's Hole Marine Biology Station.

One of our chief programs under way here on campus at present is an essay contest for freshmen. We're hoping that this will help develop a lot of interest along biological lines, and also help us to get to know these potential Phi Sigmaites. Another of our plans for campus service is to donate to the library some biological journal not already subscribed to. At present a committee is working on the tough decision of "which one?"

At one of our recent meetings we had short talks by several of our grad students concerning their thesis work. That really went over big. But it left us with one big problem. It seems that Jim Haley and Tim Driscoll send away for a lot of Acanthocephala worms. Jim takes care of the anterior end, and Tim busies himself making slides of the posterior tissue. Now our chief concern is—what good citizen of Durham can use the middle portion of these Acanthocephala? It seems a shame to let any of the little worm go to waste. Well, we plan to have more of this type of program, and hope to include something similar in an open meeting that'll be coming up soon.

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THE BIOLOGIST

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DIRECTORY

Of All Active Chapters

BETA—University of Michigan, Ann Arbor, Michigan, founded 3 June 1916.

EPSILON—University of Denver, Denver, Colorado, founded 5 March 1917.

ZETA—University of Wisconsin, Madison, Wisconsin, founded 30 May 1917.

ETA—University of Akron, Akron, Ohio, founded 20 April 1921.

KAPPA—University of Kansas, Lawrence, Kansas, founded 31 May 1921.

LAMBDA—Montana State University, Missoula, Montana, founded 4 May 1921.

NU—Washington and Jefferson College, Washington, Pennsylvania, founded 11 May 1922.

PI—Emory University, Georgia, founded 3 January 1925.

RHO—University of Illinois, Urbana, Illinois, founded 28 March 1925.

SIGMA—University of Florida, Gainesville, Florida, founded 4 December 1925.

UPSILON—Miami University, Oxford, Ohio, founded 7 May 1926.

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ALPHA RHO—University of Arkansas, Fayetteville, Arkansas, founded 23 May 1945.

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PHI SIGMA BIOLOGICAL HONOR SOCIETY

"The object of Phi Sigma is to promote interest in biological research. Although always designated as an honorary biological research society, it should be considered as a working guild of biologists interested in research. In effect, election to Phi Sigma should be an opportunity for better work, rather than merely election to an honorary society."

Mile Posts

- 1915 March 17, Alpha Chapter organized, Ohio State University, Columbus.
- 1916 May, Central Governing Body organized, BIOLOGIST first issued.
- 1917 June, last War-time BIOLOGIST issued.
- 1921 February, BIOLOGIST revived.
- 1924 December, First National Meeting, Constitution revised, Washington, D. C.
- 1925 December, Second National Meeting, First Science Program, Kansas City.
- 1926 December, Third National Meeting, Second Science Program, Philadelphia.
- 1927 December, Third Science Program, Nashville.
- 1928 December, Fourth National Meeting, Coat-of-Arms adopted, Fourth Science Program, New York.
- 1930 January, Council Meeting, Ritual Revised, Norman, Okla.
December, Fifth National Meeting, Fifth Science Program, Cleveland.
- 1931 Phi Sigma Letters Registered, U. S. Patent Office.
- 1932 December, Sixth Science Program, Atlantic City.
- 1933 June, Sixth National Meeting, Seventh Science Program, Chicago.
- 1935 December, Seventh National Meeting, Eighth Science Program, St. Louis.
- 1937 December, Eighth National Meeting, Ninth Science Program, Indianapolis.
- 1939 December, Ninth National Meeting, Tenth Science Program, Silver Anniversary, Ohio State University, Columbus.
- 1941 December, Tenth National Meeting, Dallas, Texas.
- 1946 December, Eleventh National Meeting, Boston, Mass.
- 1948 December, Twelfth Meeting, Eleventh Science Program, Albuquerque, N. Mex.
- 1949 February, Joins the Association of College Honor Societies.
- 1950 December, Thirteenth Meeting, Denver and Boulder, Colorado.